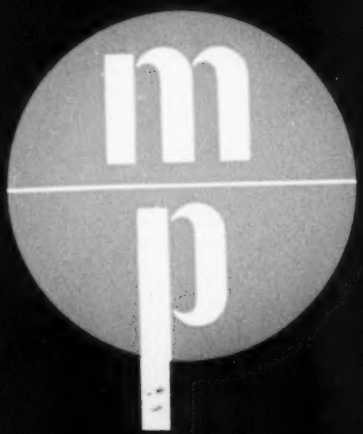
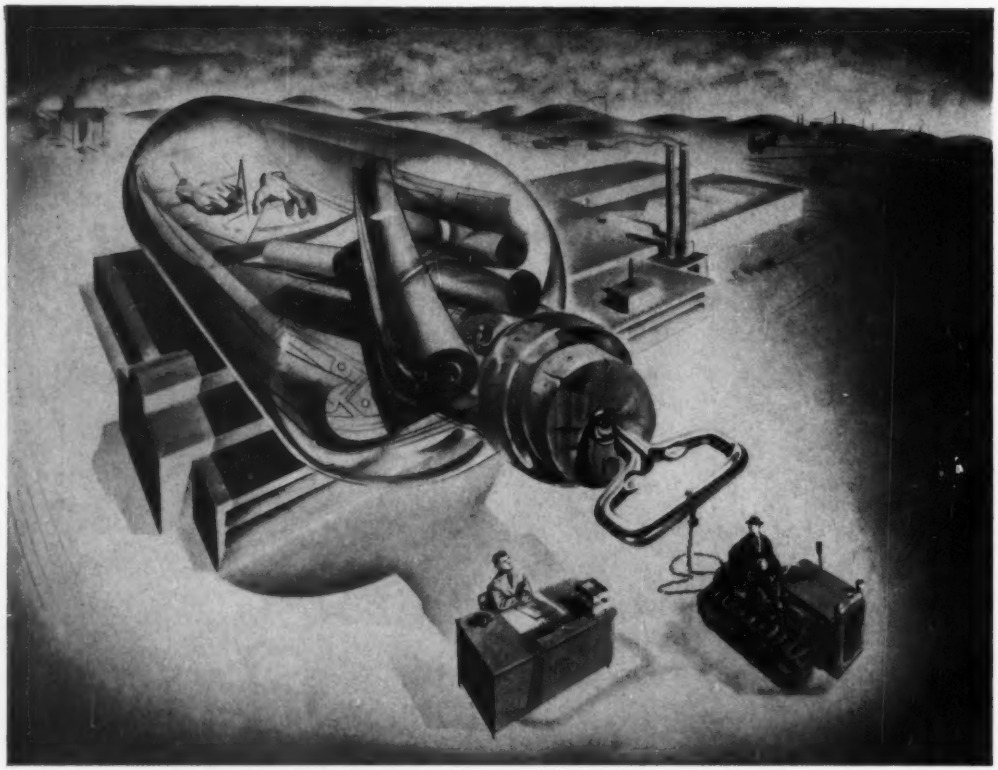
MODERN PLASTICS



APRIL 1951

To take the stopper off your development program



. . . call on your plastics molder's know-how

● Ideas for new or improved products often seem to get bottled up these days, until a custom molder of Durez plastics is brought into the picture.

Once he has seen your rough models, preliminary sketches or blueprints, your molder can open up the ever-broadening capabilities of plastics to your needs. Familiar with today's cost and service requirements, he approaches each problem with experience and imagination developed in an industry where "miracles" are fairly common. His first-rate design, engineering, and production staffs are offered as smooth-working adjuncts to your own.

When your molder recommends a Durez phenolic as the one type of plastic that best combines every service and cost factor on your job, you can depend on his judgement. He knows the versatile properties of Durez from "way back." The surface luster, impact strength, dielectric properties, dimensional stability, and resistance to heat, moisture and chemicals of Durez compounds makes the going easier for him . . . and you.

Durez has specialized from the first in the great field of phenolics. We offer you and your molder our complete experience and research facilities, through Durez field technicians.

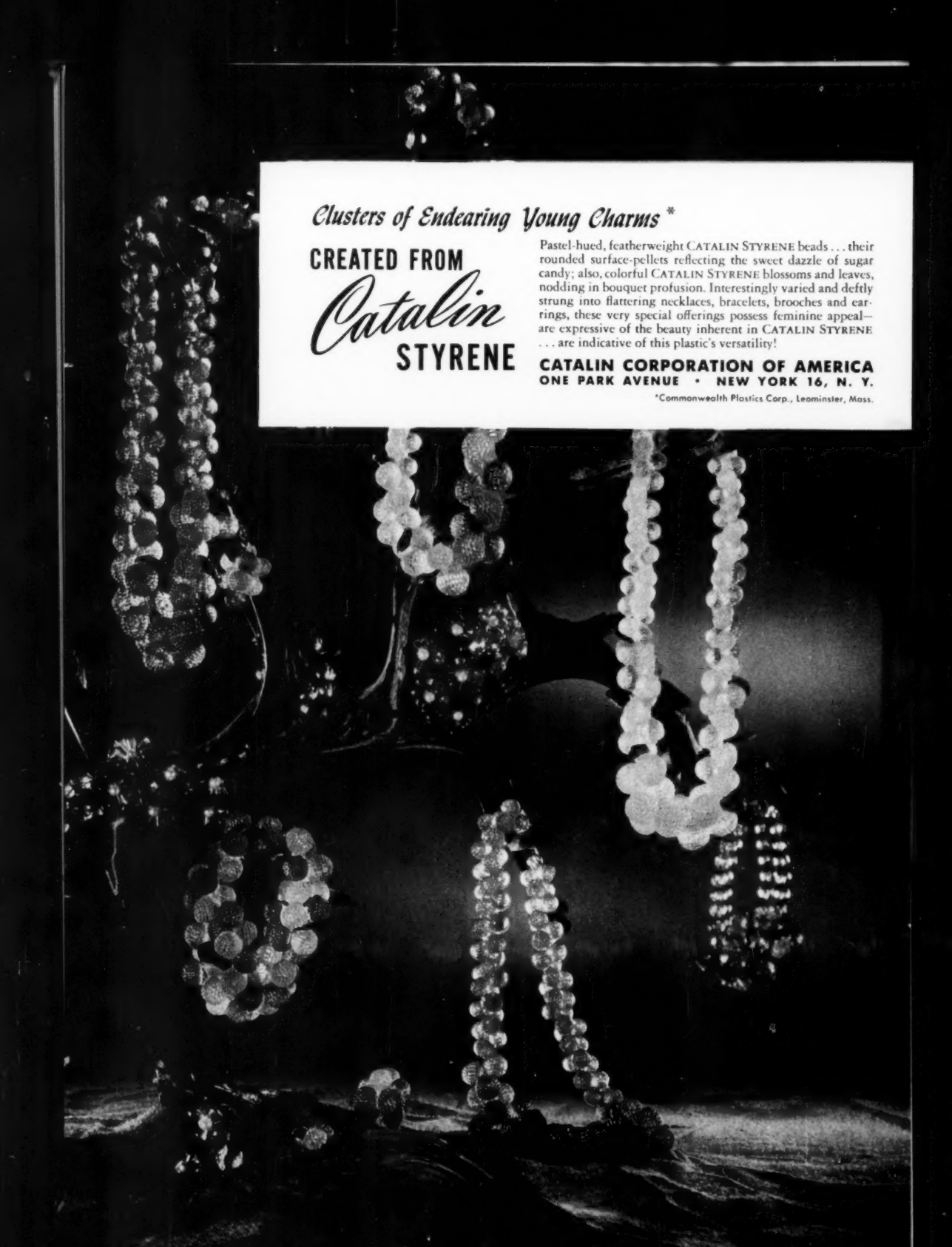
Our monthly "Durez Plastics News" will keep you abreast of industry's uses of Durez. Write, on office letterhead, to Durez Plastics & Chemicals, Inc., 1204 Walck Road, North Tonawanda, N. Y.

DUREZ

PHENOLIC RESINS

- MOLDING COMPOUNDS
- INDUSTRIAL RESINS
- PROTECTIVE COATING RESINS

PHENOLIC PLASTICS THAT FIT THE JOB


Clusters of Endearing Young Charms *
CREATED FROM
Catalin
STYRENE
Pastel-hued, featherweight CATALIN STYRENE beads . . . their rounded surface-pellets reflecting the sweet dazzle of sugar candy; also, colorful CATALIN STYRENE blossoms and leaves, nodding in bouquet profusion. Interestingly varied and deftly strung into flattering necklaces, bracelets, brooches and earrings, these very special offerings possess feminine appeal—are expressive of the beauty inherent in CATALIN STYRENE . . . are indicative of this plastic's versatility!
CATALIN CORPORATION OF AMERICA
ONE PARK AVENUE • NEW YORK 16, N. Y.
*Commonwealth Plastics Corp., Leominster, Mass.

MODERN PLASTICS*

VOLUME 28 APRIL 1951 NUMBER 8

CONTENTS

MODERN PLASTICS BULLETIN

A Special News Service ..... Facing p. 73

GENERAL SECTION

Facts for the "Substitutors" (Editorial) 5

Plastics in Aircraft—A Progress Report 73
Significant changes in plastics materials have contributed to their wider utilitarian application in aviation

Pump Housings Molded of Urea 79
Mass-produced pressure and vacuum pumps are small and compact in design, and quiet in operation

More Plastics in Tape Recorder 80
Molded acrylic parts, butyrate knobs, and styrene tape reels all contribute to the operation of a new magnetic tape recorder

Printing on Vinyl Film 81
The six methods of decorating vinyl film by printing are discussed by six experts

Translucent Porch Roof 87
Corrugated sheets of glass fiber mat and polyester resin provide shelter, let light in

Case Histories of Alkyd Molding 88
by H. W. De Vore and H. C. Murray
Proved applications of the newest thermosetting plastic material are of the utmost importance to the mobilization program

The Promise of Reinforced Plastics in Defense .. 91
Part 2 of a series of three articles points out some of the military potentialities of these materials

Phenolic and Polyester in Aerial Camera 96
Weight is reduced and performance is improved by the use of more than 24 molded parts and a large housing

Plastics Products 98
Better merchandise through correct choice of plastics for a given job

Desk Stand 162

Safety Clothing 165

Plastics in a Mechanical Heart 166

Washer Impeller 169

Lamp Shade 171

Toy Soft Drink Dispenser 172

Photo Copier 174

Vinyl Doll 176

PLASTICS ENGINEERING

Fabricating Reinforced Plastics 103
by Roger B. White
Specific details on tooling and speed used in various machining and assembly operations

Static Neutralizer for Plastics 115
Alpha rays emitted from polonium neutralize static charges, thus preventing dust collection during processing

TECHNICAL SECTION

Photographic Study of the Polymer Cycle in Injection Molding 117
by G. D. Gilmore and R. S. Spencer
Report of observations made with the aid of an injection mold having a glass wall section

Hardboard from Agricultural Residue 126
by R. V. Williamson and E. C. Lathrop
Studies of the physical properties of a number of resin-bonded panel boards produced by the "dry" process

DEPARTMENTS

Plastics Digest 132

U. S. Plastics Patents 136

New Machinery and Equipment 144

Books and Booklets 150

International Plastics News 158

Production of Plastics Materials 160

THE PLASTISCOPE 200
News of the Industry; Predictions and Interpretations; Company News; Personal; Meetings

Modern Plastics, published monthly by Modern Plastics, Inc. at Emmett St., Bristol, Conn. Executive and Editorial Office: 575 Madison Ave., New York 22, N. Y. Published each month by Modern Plastics, Inc. Entered as second class matter at the Post Office at Bristol, Conn., December 14, 1950, under the act of March 3, 1879.

Copyright 1951 by Modern Plastics, Inc. All rights reserved.

Subscription $5.00 a year, $8.00 for two years in the U. S., its possessions, and South America. Canadian subscription $5.00 a year, $8.00 for two years. All other countries $5.00 a year, $8.00 for two years, payable in U. S. currency. Price of this issue 75 cents per copy. Printed in the U.S.A. by the Hildreth Press, Inc., Bristol, Connecticut.

* Reg. U.S. Pat. Office.

News about

B. F. Goodrich Chemical Company *raw materials*

Three Aces
FROM GEON PASTE RESIN
Safety clothes coated with Geon paste resin protect workers against dangerous chemicals.
Gloves dip-coated with Geon paste resin shield hands against acids, chemicals.
Geon paste resin coating seals out moisture, dust from socket assemblies.

WHAT you see here are but a few of many articles made from Geon paste resin, the plastic material that is so easy to process.

There are dozens of other saleable products made from Geon paste resin, one of the most important being coated fabrics of various kinds—a development that has shown sensational growth.

You don't need heavy or expensive equipment to process Geon paste resin, for this thermoplastic material is easily dispersed in plasticizers to make paste-like fluids. Solvents are unnecessary. You can mold, cast or use it for coating and dipping. Versatility is its other name!

Because of the defense emergency, Geon paste resin is in tight supply at present. However, we will continue to supply experimental quantities for development work on future essential applications.

We make no finished materials but our technical service is always ready to help you with developments. Please write Dept. GA-4, B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio. In Canada: Kitchener, Ontario. Cable address: GOODCHEMCO.

Visit our exhibit—Booth 232—National Packaging Exposition, April 17-20, Atlantic City.

GEON RESINS • GOOD-RITE PLASTICIZERS . . . the ideal team to make products easier, better and more saleable.
GEON polyvinyl materials • HYCAR American rubber • GOOD-RITE chemicals and plasticizers • HARMON organic color pigments

Do you need

MOLDED PLASTIC PARTS

for defense equipment or essential civilian goods ?

■ If you do, don't take chances. Turn the job over to a top-flight molder . . . one with a proven record for skill and service. It doesn't cost any more. In fact, in the long run it is almost certain to cost you less.

Among the recognized top-flight molders you'll find Chicago Molded Products Corporation with its huge, 3-acre custom molding plant and an international reputation for doing even the toughest jobs well. You'll find here an organization with the designing skill and knowledge of materials to help you get into production swiftly and surely; the seasoned judgment to avoid misapplications; and the scope and extent of facilities to insure fast, economical production of even your largest quantity runs.

In addition, you'll find here a unique faculty for understanding your needs, plus the ability to interpret them promptly in sound engineering terms . . . the "know-how" that comes only with experience . . . the competence which is essential to a sound molder relationship.

This service is available to you now. Why settle for less? If your plans are still in the formative stage, we invite you to talk things over with a Chicago Molder engineer. If your engineering is completed, send us prints for quotation. In either case there's no obligation. Just write, wire or phone.

Consider these outstanding advantages provided by Chicago Molded:

30 years experience in plastics . . .
serving many of the biggest names in industry and pioneering many of today's most widely used and successful applications.

Defense production in World War II . . .
supplying parts used by all branches of the armed services.

Top-flight engineers and designers . . .
many with 20, 25 and even 30 years experience with this organization.

Our own mold-making department . . .
with a national reputation for quality tools of highest efficiency.

Compression, injection and plunger molding . . .
scores of presses—from small, fast acting automatics to towering giants capable of molding in volume the largest parts made . . . dozens of modern injection machines with special emphasis on large capacity . . . assuring exactly the right size and type of press for your job.

CHICAGO MOLDED PRODUCTS CORPORATION

1046 N. Kolmar Avenue, Chicago 51, Illinois

COMPRESSION, INJECTION AND PLUNGER MOLDING OF ALL PLASTIC MATERIALS

Facts for the "Substitutors"

This is an open letter to one or several officials of the National Production Authority who get themselves quoted regularly—but never by name—in newspapers to the effect that cutbacks in civilian use of metals will not necessarily mean a corresponding cut in numbers of cars, refrigerators, or other items produced because "manufacturers will be able to use plastics and other substitutes."

There are two points we would like to bring to the attention of these officials and to the attention of the correspondents who report their statements. First, in view of the fact that the connotation of the word "substitute" in trade and industry is a "deceptive replacement of one product by another of less worth," the term is inaccurate, misleading, and insulting to the Plastics Industry. Second, most plastics materials today are in relatively shorter supply than metals and are quite as strategic as metals from a military production standpoint. Every plastic is now on allocation, the amounts available for civilian products being from 80% to as little as 20% of what was available on the average for civilian use in 1950.

As to the first point, one of the chief reasons for the tremendous growth of the Plastics Industry has been the emphasis laid by this industry on the use of plastics to build better products and better values. That is why, when a plastic has replaced wood, metal, leather, or other non-plastic material in a product component or in a complete product, the result has been that the plastic becomes the standard material for that application, superseding but not substituting for the non-plastic. In almost every case when a plastic supersedes a non-plastic, complete redesign of a product and all its parts is involved so that the result is a new product and a better product.

The refrigeration industry has multiplied its use of plastics by almost six since 1945; the radio industry has tripled its use of plastics; the automotive industry has doubled its use of plastics; the toy field has tripled its use of plastics; the packaging industry has tripled its use of plastics—and in a time when non-plastic materials, including all metals, were readily available. As a matter of fact, in all of these industries the threatened shortage of metals is probably less serious than the existing shortage of plastics.

Concerning our second point, let the NPA officials and the reporters get in touch with the Bureau of Ships, the Signal Corps, the Corps of Engineers, the Ordnance Laboratories, the aeronautical officials, the Quartermaster Corps, the Chemical Corps, and the people in charge of the guided missile program. They will learn that plastics are not being considered as substitutes by those in charge of mobilization development and procurement of military materiel, but are recognized for what they are—superior engineering materials to be used for thousands of military purposes because no other materials will perform so well in those applications.

So short is the supply of plastics in relation to civilian demands and military procurement plans that, in cases of applications of marginal utility, manufacturers are today looking about for substitutes for plastics!

President and Publisher
CHARLES A. BRESKIN

Editorial Staff

Editor: HIRAM MCCANN
Technical Editor: DR. GORDON M. KLINE
Engineering Editor: FRED B. STANLEY
Senior Editor: R. L. VAN BOSKIRK
Managing Editor: A. PAUL PECK
Art Director: DONALD R. RUTHER
Associate Editor: WARREN H. GOODMAN
Assistant Managing Editor: E. S. BLACK
Assistant Editor: JOAN MOISSEIFF
Midwestern Editor: VAL WRIGHT
Readers Service: EMMA TURAK

Business Staff
Vice President and General Manager:
ALAN S. COLE

P. H. Backstrom — B. W. Gussow
M. A. Olsen — W. F. Kennedy
J. M. Connors — J. C. Galloway
R. C. Beggs — S. S. Siegel

Promotion Manager: PHILIP W. MULLER
Production Manager: DANIEL M. BROADS
Asst. Production Manager: B. J. FARINA
Asst. to Publisher: THEODORE B. BRESKIN

Circulation Department
Circulation Manager: FREDERICK A. KLEIN

Executive and Editorial Offices
575 Madison Ave., New York 22, N. Y.
Tel., PLaza 9-2710

Branch Offices
Chicago 1: 221 N. La Salle St.
J. M. Connors Tel., Financial 6-3450

Cleveland 14: 815 Superior Ave.
R. C. Beggs Tel., SUperior 1-0737

Los Angeles 17: 816 West Fifth St.
J. C. Galloway Tel., Mutual 8335

London, England:
L. H. Dolaro, 10/12 Broad St. Ave., Blomfield St., London, E. C. 2

MODERN PLASTICS is fully protected by copyright and nothing that appears in it may be printed wholly or in part without special permission.

Member Audit Bureau of Circulations
MODERN PLASTICS is regularly indexed in Industrial Arts Index and Industex.

ONLY ONE COMPANY CAN PROVIDE

THIS *Unique 4-Point Plastics Service*

1 DEVELOPMENT OF SPECIAL PLASTICS MATERIALS

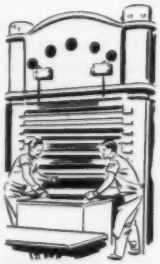
The Richardson Company maintains complete laboratory facilities for the development of new plastics materials—including various combinations of resin, rubber, and other materials—for special applications.

2 ENGINEERING DESIGN OF SPECIAL PLASTICS PARTS

Richardson will handle your plastics problem from beginning to end: analyze your requirements; help design for performance, appearance, and low cost; and develop the material and process best suited to your needs.

3 COMPLETE MOLDING FACILITIES

With its six plants, Richardson is one of the world's largest molders of plastics. Its processes include compression and transfer molding of thermosetting materials and injection molding of thermoplastic materials.



4 COMPLETE LAMINATING FACILITIES

INSUROK laminated plastics are made in all standard grades, plus many exclusive special grades, in sheets, rods, and tubes. Richardson also produces PLASTOK decorative laminate in many patterns, colors, and sizes.

FOR YOUR SPECIAL PLASTICS JOBS *Consult* *The* RICHARDSON COMPANY

For a better plastics part at a lower cost, it pays to consult The Richardson Company. For Richardson is the only large manufacturer in the industry that develops new plastics materials and produces laminated and molded plastics, molded laminates and post-formed laminates. Because of this versatility, Richardson is in a position to help engineer your product for the most efficient and economical method of production.

FOUNDED 1858—LOCKLAND, OHIO

2789 Lake Street, Melrose Park, Illinois (Chicago District)

MELROSE PARK, ILL.

INDIANAPOLIS, IND.

NEW BRUNSWICK, N. J.

NEWNAN, GA.

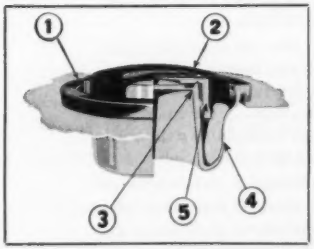
TYLER, TEX.

OGDEN, UTAH

SEALS WITHOUT SEEPAGE...POURS WITHOUT SPLASH

The Texas Company uses new pouring spout-closure made with Du Pont "Alathon" to fill need of 18 years' standing

For 18 years or more, The Texas Company reports, shippers have needed a closure for pails that would seal without evaporation and leakage. Now, with the new "FlexSpout"* closure, which they use in shipping automotive and industrial lubricants, Texaco has the solution to this problem. Moreover, they can offer their customers an easier, more efficient method of pouring.



CUTAWAY shows how "FlexSpout" protects contents. (1) Metal rim clamps gasket directly to pail, (2) tamperproof metal seal is destroyed at first removal, (3) hermetic seal molded as part of spout provides added protection against leakage, tampering, (4) continuous retractable spout and diaphragm molded of "Alathon" makes leakproof seal, lets contents drain without ever touching outside of spout, (5) cap of "Alathon" for re-use after seals are broken.

The spout-closure, is made with Du Pont "Alathon"† polythene resin. Before adopting it, Texaco put it through a series of tests exaggerating actual shipping hazards—rough treatment, humidity, etc. Result: no sign of losses through evaporation or leakage. Texaco now uses "FlexSpout" for all domestic and export shipping.

The unusual combination of properties found in "Alathon" fits the "FlexSpout" to a "T." Its flexibility is made to order for the retractable spout design —as is its extreme toughness. Its resilience allows a crimped, leakproof seal, which will withstand the pressures that might build up in the container during shipment. "Alathon" has excellent chemical resistance, is tasteless, odorless, non-toxic, and so cannot contaminate or otherwise harm the contents.

Along with its use for closures and a variety of other forms of packaging, "Alathon" is finding many applications in a wide range of industries. It may well be of service to you. Demand for "Alathon" currently exceeds supply. However, we suggest you investigate its properties, and prepare for future applications. We'll gladly discuss the availability of quantities for development work. For information, write:

E. I. du Pont de Nemours & Co. (Inc.)
Polychemicals Dept., District Offices:
350 Fifth Avenue, New York 1, N. Y.
7 S. Dearborn St., Chicago 3, Ill.
845 E. 60th St., Los Angeles 1, Calif.

**"FlexSpout" made by Rieke Metal Products, Auburn, Indiana*

†TRADE-MARK

DU PONT
PLASTICS
Better Things for Better Living
...through Chemistry

WE NEVER STOPPED producing for defense!

PROLON CUSTOM-MOLDED BATTERY CASE for U. S. Air Force F-80 and F-84 jet planes. Size 12" x 11" x 8½". Injection molded in two parts each weighing 4½ pounds. Sub-contracted for Exide and National Batteries.

Prolon Plastics is equipped, ready and able to give mass delivery of custom-molded Production for Defense . . . *fast!*

Right now we are working on defense projects for the Navy, the Air Forces, and for the Army Signal Corps and Medical Corps. During World War II, Prolon Plastics was a major producer of plastic parts for the Proximity Fuse, an item rated second only to the Atomic Bomb in military importance.

Precision molding? We are currently turning out moldings with *exacting* tolerance limitations! If you have a job that calls for skilled, conscientious workmanship . . . for mass production . . . for prompt dependable deliveries, consider our facilities and record.

Whether *your* requirements are defense or civilian production, a letter, a wire, or a telephone call will bring one of our planning engineers to your office. No obligation.

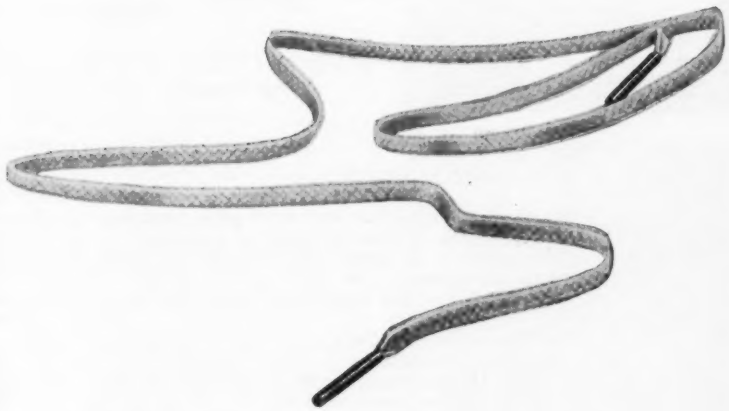
ARE PLASTICS THE ANSWER TO YOUR PROBLEM?

PROLON PLASTICS

PLANNING • DESIGNING • DIE MAKING • MOLDING FOR CIVILIAN OR DEFENSE PRODUCTION

PROLON PLASTICS, A DIVISION OF PRO-PHY-LAC-TIC BRUSH COMPANY, FLORENCE, MASS.

How Many Feet to the Mile of Celanese* Acetate Sheeting?



The tiny plastic shoelace tip may give you the big product-improvement idea you're looking for

Over a quarter of a million . . . for that is the number of pairs of shoelace tips that are made from a mile of Celanese *acetate* sheeting—about 1 inch wide!

Perhaps you didn't know that the modern shoelace is up-to-date with acetate plastic tips—rolled from sheet stock and fused to the lace so that they won't come off. Plastic shoelace tips made from Celanese *acetate* sheeting start the day right for millions. Perhaps you have a product idea that needs a good start—and at less cost. If so, Celanese *acetate* sheeting may be the answer.

ARE YOU UP-TO-DATE ON ACETATE?

Here is why Celanese *acetate* sheeting is tops for tips: it is available in a range of colors thus the painting step in manufacturing is eliminated . . . colors can't chip off . . . the tip can be fused to the lace because acetate is thermoplastic. This creates a bond that won't work loose . . . it is one-third the weight of metal. For information pertaining to your particular requirements write: Celanese Corporation of America, Plastics Division, Dept. 101-D, 180 Madison Avenue, New York 16. In Canada, Canadian Cellulose Products, Limited, Montreal and Toronto.

Celanese*

*Reg. U. S. Pat. Off. PLASTICS

Tupper Seal, air and liquid tight flexible covers fit, and are included in the sets of all Tupperware Canisters.

The Tupperware 50 oz. Canister is "standard equipped" with the Tupper Seal, air and liquid-tight flexible Pour All cover.

The Tupper Seal, air and liquid-tight flexible Pour All cover is used on every Tupperware 20 oz. Canister.

The Tupper Seal, air and liquid-tight, Pour All cover as a cover for 46 oz. cans; Tupperware Sauce Dishes and other containers of metal, glass or pottery. Foods easily dispensed without removing entire cover.

The Tupperware Wonder Bowls are usually fitted with Tupper Seal, air and liquid-tight covers.

Argentine Patent 74,095 dated Dec. 14th, 1949 on invention covered by U. S. Patent 2,487,400 November 8, 1949. Canada Patent 463,387 Feb. 28th, 1950, Union of So. Africa Pat. 8,592 Sept. 21st, 1949. Belgium Pat. 491,293 Oct. 15th, 1949. Switzerland Patent 48,970 Sept. 23rd, 1949, Italy Patent 456,937 September 19th, 1949. Other U. S. and Foreign Patents Pending.

TUPPER! Seals

air and liquid-tight, flexible covers for Tupperware Tumblers, Canisters, Wonder Bowls, Cereal Bowls and many another container of glass, metal and pottery, the contents of which it is desired to keep fresh and wholesome.

TUPPER!

FORMAL NOTICE! 9th November, 1949

EXCLUSIVE!

U. S. Patent #2,487,400

The Tupper Corporation has attained a position of leadership in this industry by incurring great expense and expending painstaking effort in the development, design, manufacture and exploitation of its many world-known products.

The Tupper Corporation further has anticipated the inevitable attacks to which leadership is subject and has taken measures provided by law to preserve the creative rights to its products, methods and design by patent protection both in the United States and abroad.

Tupper Seals for Tupperware shown in this advertisement are just a few of the forms covered in this manner and are specifically covered by U.S. Patent #2,487,400.

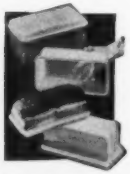
Only the Tupper Corporation, by U.S.Patent #2,487,400 has the right to make, use and vend container closures in connection with any and all types of containers throughout the United States and its territories as covered by the claims of the Patent.

Tupper Corporation will protect, according to law, the exclusive rights above granted

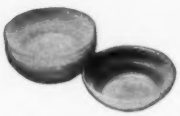
TUPPER CORPORATION

There's a Tupper Seal, air and liquid-tight flexible cover for Tupperware 2, 5, 8 and 12½ oz. Tumblers too, and these Tupper Seal, covers fit many other containers of metal, glass and crockery.

The Tupper Seal, air and liquid-tight flexible Por Top cover, specially designed as a dispensing cover for specified diameters of containers holding foods such as syrups, salad dressings, catsup.



The cover of the Tupperware Bread Server which serves as a bread tray also is designed to give similar results as Tupper Seal, air and liquid-tight Flexible covers. Keeps contents fresh as no other such container.



When equipped with Tupper Seal, air and liquid-tight, flexible covers, Tupperware Cereal Bowls serve many another purpose.

The Tupper Seal, air and liquid-tight flexible cover made for Tupperware 8 oz. Tumblers also fits and is sold with all Tupperware Funnels as a base when funnels are used as storage containers.

TUPPER CORPORATION

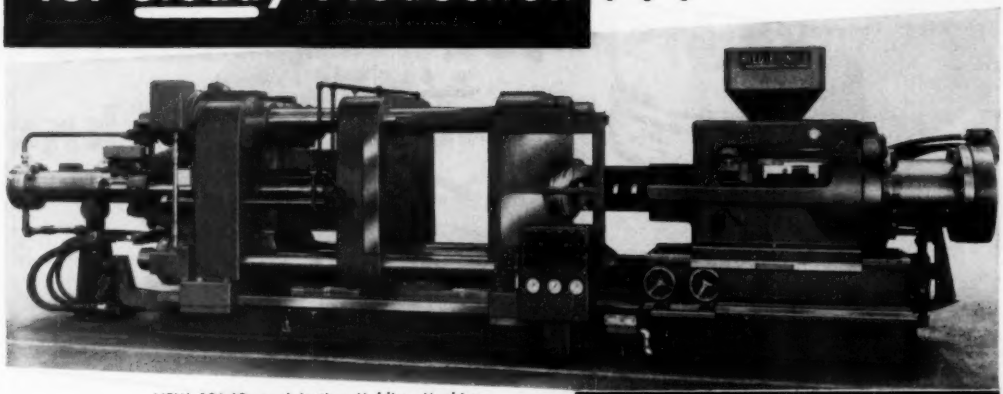
Manufacturers of — CONSUMER, INDUSTRIAL, PACKAGING AND SCIENTIFIC PRODUCTS

FACTORIES: Farnumsville, Mass., and Cuero, Texas New York Show Rooms 225 Fifth Ave.

ADDRESS ALL COMMUNICATIONS TO: Department B

COPYRIGHT TUPPER CORPORATION 1950

for Steady Production . . .



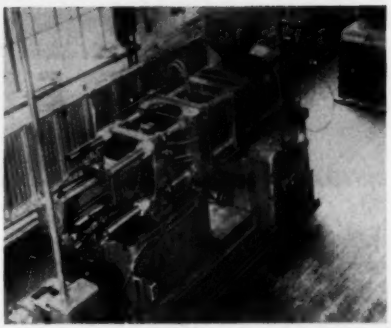
NEW 10J-60 oz. Injection Molding Machine

. . . you can rely on "REEDS"

From the small 5A-4 oz. model to the large 10J 60 oz. press pictured above, Reed-Prentice injection molding machines are designed right and built right to give trouble-free service 24 hours a day, week after week and year after year.

The actual production record of a #10-2 oz. "Reed" at Toledo Plastics Co., Toledo, Ohio, is typical of the unexcelled performance of all Reed-Prentice injection molding equipment. This #10 machine has been in almost continuous 24-hour operation for over 11 years without needing any major repairs.

SPECIFICATIONS	5A-4	10D-8	10D-12	10E-16	10H-24	10H-32	10J-60
Die locking pressure, tons	125	275	275	400	600	600	1000
Rated Casting area, sq. in.	50	125	125	150	300	300	350
Mold Opens	8"	10¼"	10¼"	16"	24"	24"	36"
Max. die space	12"	16"	16"	24"	28"	28"	40"
Size: die plates	16 x 21"	21 x 25"	21 x 25"	35 x 40"	45 x 45"	45 x 45"	60 x 60"
Oz. molded per shot (acetate)	4	8	12	16	24	32	60
Pressure psi on material	16,000	20,000	20,000	23,000	24,500	24,500	24,500



OLD #10-2 oz. Reed-Prentice Injection Molding Machine at Toledo Plastics Co., Toledo, Ohio

For complete details on the world's most dependable injection presses, contact the Reed-Prentice branch office or representative in your territory.

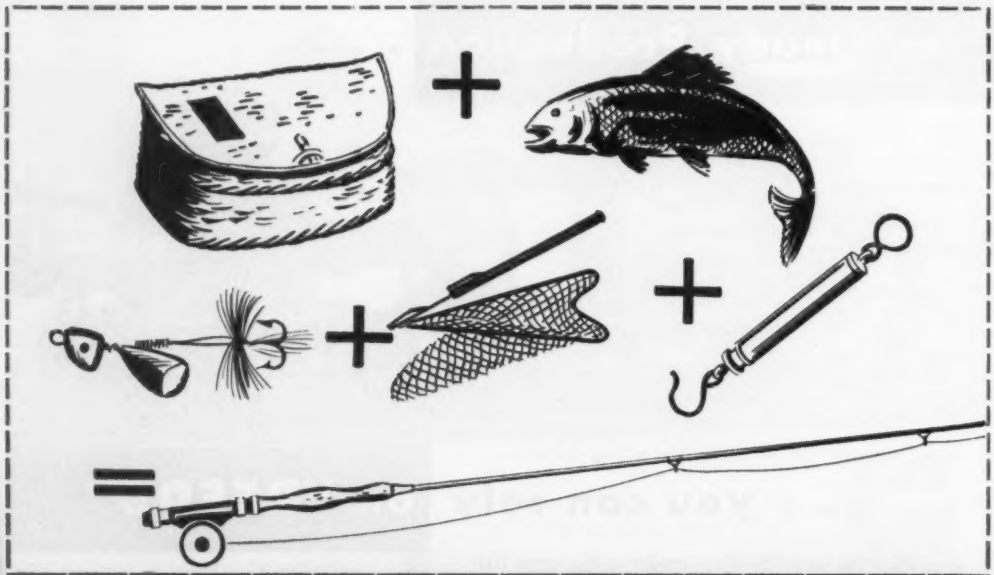
THE WORLD'S LARGEST MANUFACTURERS OF INJECTION MOLDING MACHINES

REPRESENTATIVES:
Detroit ..... Kordenbrock Machinery Co.
Grand Rapids ..... Joseph Monahan Co.
Syracuse ..... J. F. Owens Machinery Co.
Houston ..... Preston Machine Tool Sales Co.
Seattle & Spokane ..... Star Machinery Co.
Minneapolis ..... Chas. W. Stone Co.

INJECTION MACHINES
REED-PRENTICE CORP.
WORCESTER MASS., U.S.A.

MAIN OFFICE: 677 Cambridge St. WORCESTER 4, MASS.

BRANCH OFFICES:
NEW YORK: 75 WEST STREET
CLEVELAND: 1213 W. 3rd ST.
CHICAGO: 2400 W. MADISON ST.
LOS ANGELES: 2314 SANTA FE AVE.



PUZZLE

Find the profit here!

Hidden in this unbusiness-like scene is a unique new construction material that's booming business, building profits every day.

It's the incredibly tough Fiberglas*—plastic reinforcement used to make the fishing rod.

Why did tackle makers choose Fiberglas? Because plastics reinforced with Fiberglas materials are stronger than the finest steel . . . easier to fabricate than most metals . . . and impervious to weather, water, or age.

Alert businessmen are using these new Fiberglas reinforcements to make many products, such as pleasure craft and assault boats that never need caulking or painting . . . civilian luggage and military transit cases that defy wear . . . boxes and trays for food transport . . . and electrical appliance parts that perform better, are quick and easy to fabricate.

Regardless of your production problems or your markets, we believe you'll be vitally interested in this new engineering material. Let's get together and work out a way to build your sales, save you money, with Fiberglas reinforcements. Write Owens-Corning Fiberglas Corporation, Reinforced Plastics Division, Department 125, Nicholas Building, Toledo 1, Ohio.

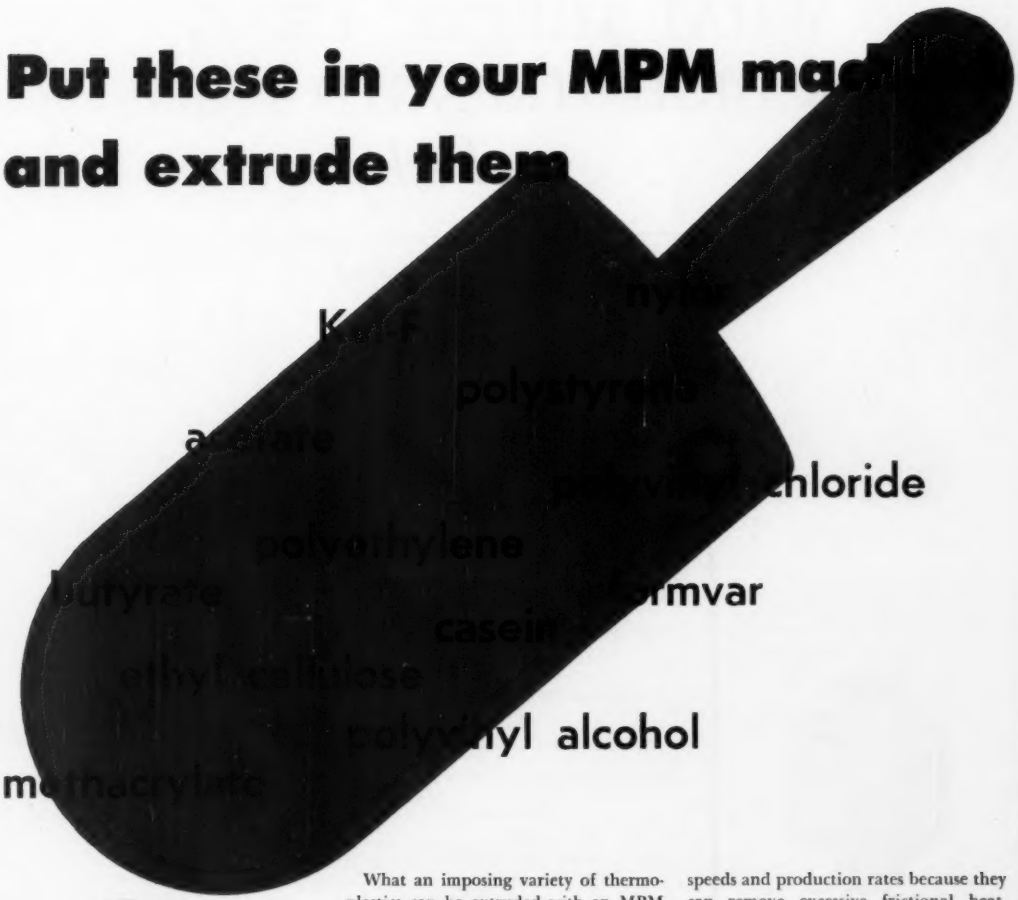
OWENS-CORNING FIBERGLAS

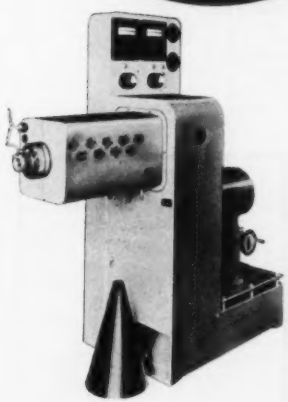
Yarns

*Fiberglas is the trade mark (Reg. U. S. Pat. Off.) of Owens-Corning Fiberglas Corporation for a variety of products made of or with glass fibers.

FIBERGLAS IS IN YOUR LIFE . . . FOR GOOD!

Put these in your MPM mac[illegible] and extrude them





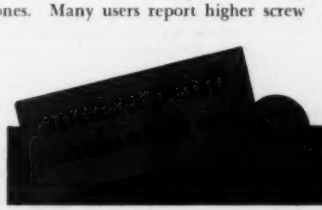
What an imposing variety of thermoplastics can be extruded with an MPM extruder! So many, in fact, that users refer to it as "the most versatile extruder there is."

A unique heat control system – with six individually controlled electrically heated zones plus from 9 to 15 cooling zones along the extruder cylinder – does the trick.

The 2½" and larger machines provide two automatic temperature controllers for dies and four on the cylinder. Excessive frictional heat is indicated on the control board and controlled by adjustment of valves to the respective cooling zones. Many users report higher screw speeds and production rates because they can remove excessive frictional heat. Better tolerance and surface finish is obtained when the material itself can be controlled.

With new plastic materials and variations of older ones making their appearance with startling frequency, is it any wonder that eighteen major material suppliers use versatile MPM extruders for experimental extrusion work.

Put yourself on the safe side. Before purchasing an extruder consider the outstanding flexibility offered by MPM. MPM extruders are known for precision production and high output. Details on request.

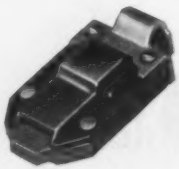


15 Union St., Lodi, N. J., U. S. A.
Cable Address: MODPLASEX

California Representative:
WEST COAST PLASTICS DISTRIBUTORS, INC.
2325 Jesse Street, Los Angeles 23, Cal.

WHAT THEY'RE* USING FOR HIGH STRENGTH PARTS

.... *and why!*



*** BULLDOG ELECTRIC PRODUCTS COMPANY**

ROGERS RM-12338

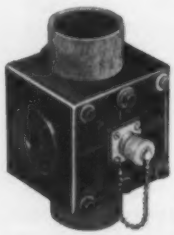
PART: Vacu-Break Switch Head

MOLDER: The RICHARDSON COMPANY

Strength and toughness to withstand punching, fabricating and riveting operations after molding.

Reduced the number of parts used in forming the head, thus effecting a substantial decrease in labor costs.

Mandatory for operation of Vacu-Break Switches that material used in HEADS have unusual stability and not be affected by atmospheric conditions.



*** AMERICAN PHENOLIC CORPORATION**

ROGERS RM-15000E

PART: Antenna coupling for Signal Corps

High impact strength.

Part, weighing one pound, was drop-tested from heights of 12 feet. Did not chip or crack.

*** LIONEL CORPORATION**

ROGERS RX-421

PART: Housings, switch bases, coil forms

Stands up under the shock of trimming and riveting on a punch press.

Provides a firm, non-cracking grip for self-tapping screws, eliminating need for metal inserts.

Smooth, gleaming surface assures eye appeal for visible components.

Write for "Here's Rogers and Its Fiberloys" — Dept. P, Rogers Corporation, Manchester, Conn. This entertaining booklet will help you decide if our plastics and other Fiberloys by Rogers have a place in your products.

Better Parts for Better Products

ROGERS
CORPORATION
Established in 1832

Inaugurating a new era in plastics molding

the new 300 oz.

Watson-Stillman Injection Molding Machine

DIE SPACE 62" × 72" CLAMP 1500 TONS

NEW ECONOMY... NEW FLEXIBILITY

Significant evidence of Watson-Stillman's ability to anticipate and meet unusual requirements of plastics molders is the record-smashing 300-ounce Injection Machine . . . NOW—READY FOR YOU.

Fifty per cent larger than its largest predecessor, this latest compact unit opens new vistas to every department of plastic products development. For the designers larger integral moldings, heavier sections where needed, without taxing capacity. For the production chiefs less operating expense and lower maintenance per pound, or unit, of product. For top management greater PROFITS, through broadened scope of facilities, improved competitive position, and all the other advantages naturally attendant upon increased unit capacity and greater over-all production.

This machine, like others in the W-S COMPLETELINE, was developed to meet existing needs of the industry. Whether you mold one ounce or fifteen pounds, and whether you need INJECTION, TRANSFER or COMPRESSION Molding Machines, you will find the most efficient, economical, and profitable answer to your engineering problems through the close integration of Watson-Stillman's development and manufacturing facilities which always keep the methods and machines of our fast-moving industry up to date.

Remember—when planning plant expansion or a new product—consult W-S first about plastics machinery and [illegible]

WATSON-STILLMAN

HYDRAULIC MACHINERY DIVISION, ROSELAND, N. J. [illegible]

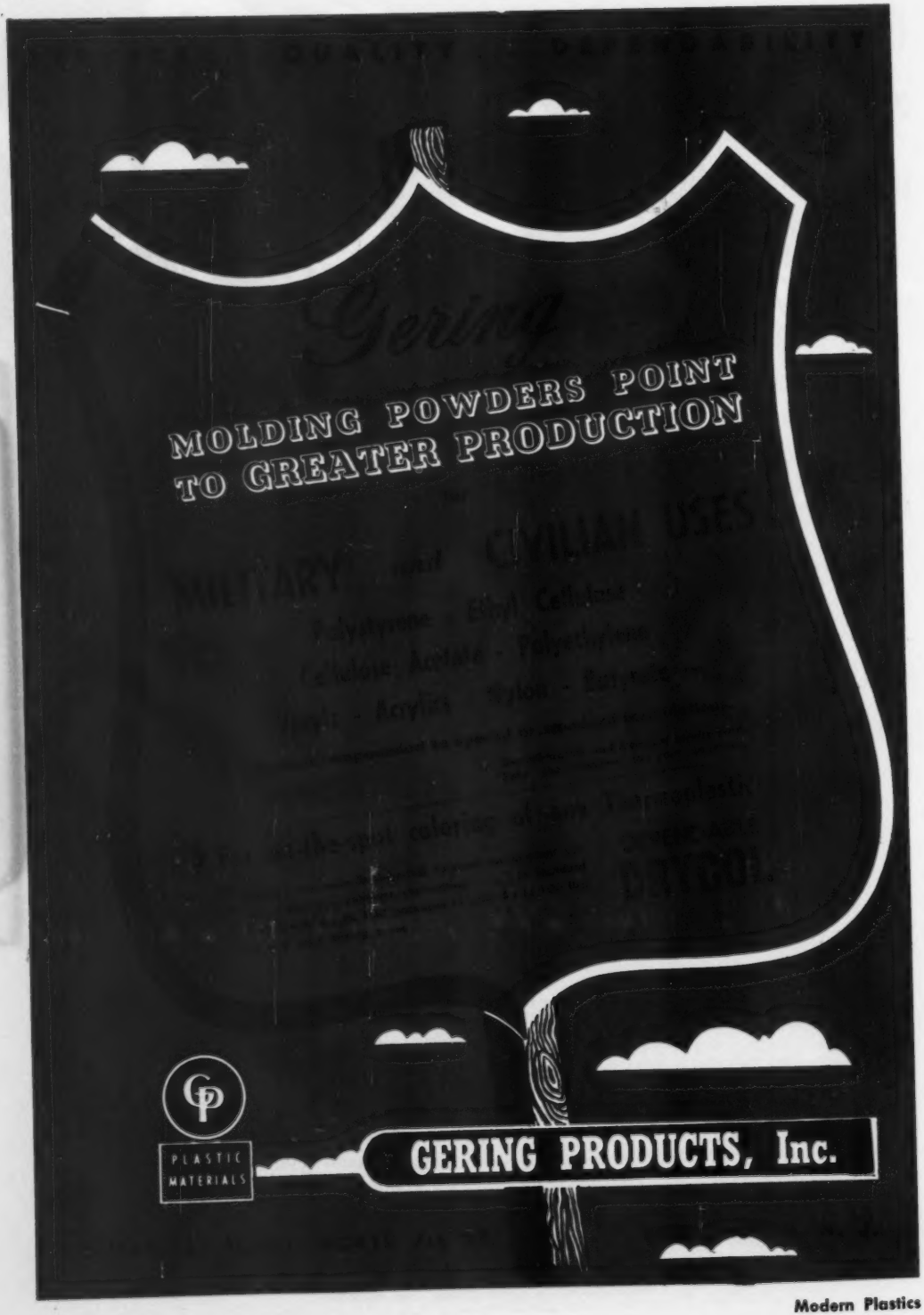
Branch Offices Chicago, Ill. Manufactured in Canada by — Canadian Vickers, Ltd., Montreal

REPRESENTATIVES

Birmingham 3, Ala. ..... George M. Rowland Co.
Denver 2, Colo. ..... Overpeck Machine Tool Co.
Indianapolis 20, Ind. ..... [illegible]
W. L. Hilliard Mach. Co.
Los Angeles 11, Calif. ..... [illegible]
Pittsburgh 19, Pa. ..... [illegible]
Portland, Ore. ..... [illegible]
Rochester 11, N.Y. ..... [illegible]
San Francisco 7, Calif. ..... [illegible]
St. Paul 4, Minn. ..... Anderson Machinery Co.
Seattle, Wash. ..... Machinery & Tool Co.
Toronto 4, Ont. ..... Rudolph & Delamere

Foreign Sales Representatives: CHAS. PFIZER & CO., 630 Fourth Ave., New York 16, N. Y. Correspondents Throughout the World

FOR 1 TO 300 OUNCE MOLDINGS—the W-S COMPLETELINE—the shortest distance between production and profit


Gering
MOLDING POWDERS POINT
TO GREATER PRODUCTION
PLASTIC
MATERIALS
GERING PRODUCTS, Inc.

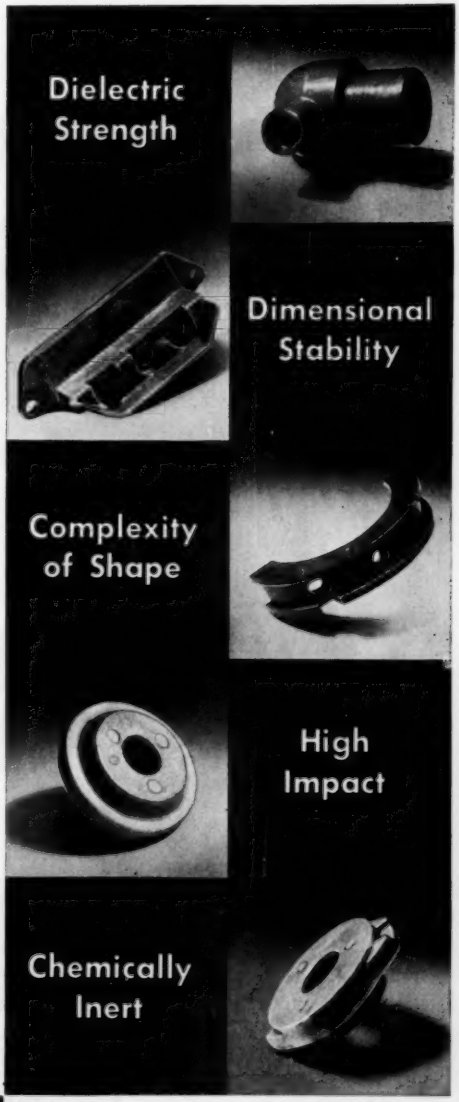
Could you use this *new* moulded plastic?

RIGHT NOW, plastics widens its entire scope of use! As these photos of unmachined production pieces show, Kurz-Kasch engineers have solved the problem of moulding glass-filled polyester resin in complex forms and shapes—with holes and with variable wall sections. Now you can plan on plastic mouldings with new strength characteristics.

CHARACTERISTICS. As a thermosetting resin, polyester offers excellent dimensional stability—good electrical characteristics—good resistance to chemicals and medium high temperatures (can withstand 325° F. continuously). The glass fibres, with high tensile strength, are a good electrical insulator, are chemically inert and heat resistant. Combined and moulded by the Kurz-Kasch process, you get a material with a specific* tensile strength comparable to steel! (*Specific-strength to weight ratio.)

PLEASE NOTE—Because of the strategic importance of this newest of a long line of Kurz-Kasch pioneering developments in plastics, we expect our output to be confined presently to priority orders. There are refinements still to be developed. And at this early stage, our technique still confines us to smaller to medium-sized pieces. But look at the possibilities! If your job is one for which this moulding technique and these material characteristics are applicable—let's talk it over, quick!

P. S. *Your conventional thermosetting moulding jobs would be in good hands here at Kurz-Kasch, too. We offer complete facilities, lots of production experience, and a reputation for knowing plastics.*

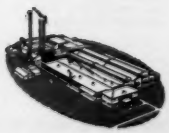


Kurz-Kasch

FOR OVER 35 YEARS PLANNERS AND MOULDERS IN PLASTICS

Kurz-Kasch, Incorporated • 1415 South Broadway • Dayton 1, Ohio

BRANCH SALES OFFICES: New York, *Lexington 2-6677* • Rochester, *Hillside 2415M* • Chicago, *Harrison 7-5473* • Detroit, *Trinity 3-7050* • Philadelphia, *Granite 2-7484* • Dallas, *Logan 5234* • Los Angeles, *Prospect 7503* • St. Louis, *Delmar 9577* • Toronto, *Girard 9711* • **EXPORT OFFICE:** 89 Broad Street, New York City, *Bowling Green 9-7751.*



When It's Grinding or Pulverizing

STURTEVANT EQUIPMENT

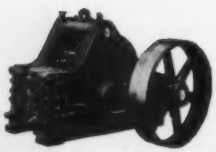
DOES THE JOB FAST!

Whether you grind soft or hard materials, there is a Sturtevant Grinder or crusher exactly suited to your requirements.

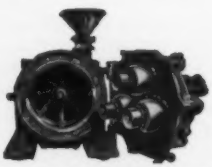
Tough and rugged, Sturtevant Equipment has the built-in stamina to stand up under continuous operation. Most of this equipment has the "open door" accessibility which makes cleaning easy.

Look into Sturtevant Grinders and crushers for your applications. These machines will give you the exact mesh you want . . . cut your costs by increasing production. Write for catalog today.

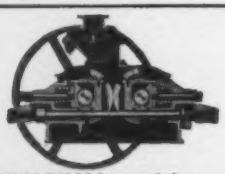
ROTARY FINE CRUSHERS for intermediate and fine reduction (down to ¼"). Open door accessibility. Soft or moderately hard materials. Efficient granulators. Excellent preliminary Crushers preceding Pulverizers.



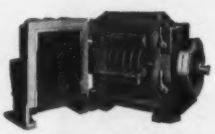
JAW CRUSHERS for coarse, intermediate and fine reduction of hard or soft substances. Heavy or light duty. Cam and Roller action. Special crushers for Ferro-alloys. Several types, many sizes.



RING-ROLL MILLS for medium and fine reduction (10 to 200 mesh), hard or soft materials. Very durable, small power. Operated in closed circuit with Screen or Air Separator. Open door accessibility. Many sizes. No scrapers, plows, pushers, or shields.



CRUSHING ROLLS for granulation, coarse or fine, hard or soft materials. Automatic adjustments. Crushing shocks balanced. For dry or wet reduction. Sizes 8 x 5 to 38 x 20. The standard for abrasives.



SWING-SLEDGE MILLS for coarse and medium reduction (down to 20 mesh). Open door accessibility. Soft, moderately hard, tough or fibrous substances. Built in several types and many sizes.

MOTO-VIBRO SCREENS screen anything screenable. Classified vibrations. Unit construction—any capacity. Open door accessibility. Open and closed models with or without feeders. Many types and sizes—range of work ½" to 60 mesh.

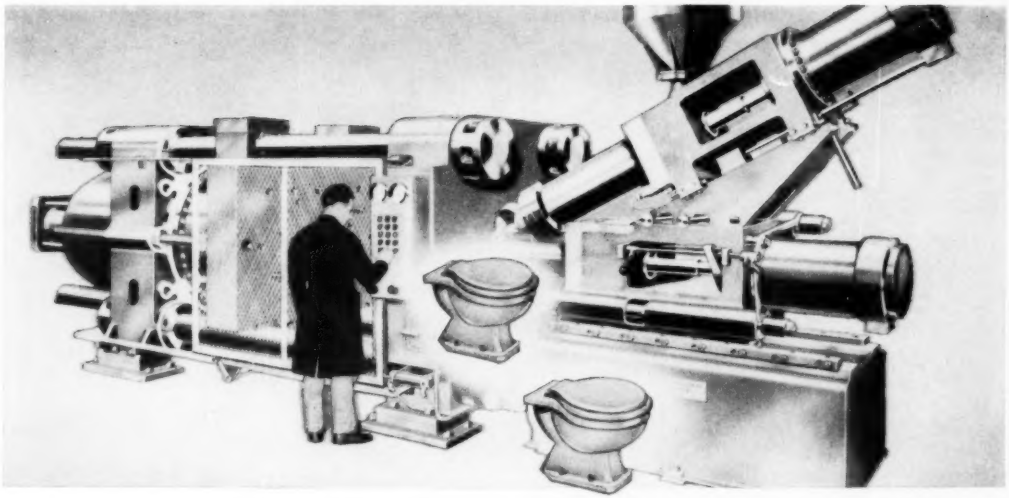
STURTEVANT MILL COMPANY

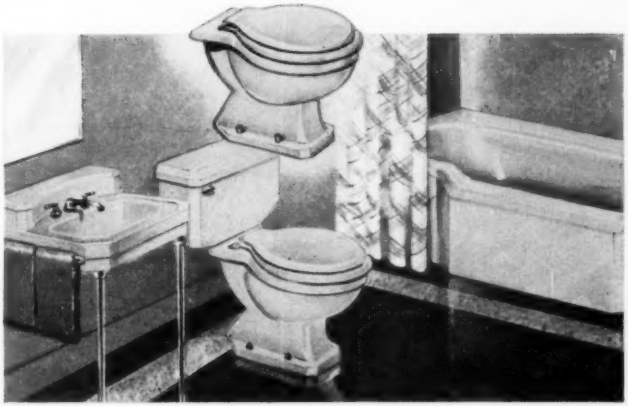
110 CLAYTON STREET, BOSTON 22, MASS.

DESIGNERS & MANUFACTURERS OF BINS AND EXCAVATORS • MIXERS • SCREENS • PULVERIZERS • ELEVATORS • AND COMPLETE FERTILIZER UNITS

New Horizons in Plastics

by DALE AMOS* and J. C. KAZIMIER**





New giant plastics machine achieves results heretofore unmatched in the history of injection molding.

For example: Bathroom fixtures for homes, trains, planes, and ocean liners. Beautiful. Strong. Lightweight (i.e., Shipping weight of conventional toilet is 60 pounds—Plastic toilet, less than 10 pounds.)

Undreamed of applications, *giant* plastic parts and products of *exceptional* strength-weight ratio, are now entirely practical with the new 300-ounce injection molding machine—*largest in the world.*

A typical example (illustrated, lower-right) is the showing of bathroom fixtures for homes, trains, planes, and ocean liners. These units are light-weight, chip-proof, and available in immaculate white, lovely pastel shades, or brilliant colors. In addition to their strength (¼" wall), beauty and initial economy, a typical toilet stool alone saves 50 pounds in shipping weight—the difference between a conventional unit at 60 pounds and a new plastic toilet stool at less than 10 pounds. This weight saving is particularly important in common carriers where it permits greater payload on every trip.

And the new 152,000-pound plastics machine—31 feet long (42 feet with preplasticizing unit)—die space 48" x 72"—clamp 1500 tons—depth of draw 18"—over 1000 sq. in. projected area—can turn out complete washing machine tubs, refrigerator shells, children's furniture, play pens, baby bathinettes and bassinets, kitchen equipment, plumbing fixtures, furniture, chairs, chests, radio and television cabinets, plus a long list of other products that is limited only by the imagination and skill of the design-engineer.

A particularly significant and timely advancement in the light of the new national defense program, posing a challenge to every American manufacturer, the increased capacity and efficiency of the 300-ounce machine will mean greater production, fewer man-hours, plus the conservation of critical materials.

Climaxing an increase in machine capacity at our plant from 6 ounces in 1939—to 24 ounces in 1945—32 ounces in 1947—and jumping to 60 ounces in 1949—the new 300-ounce machine will achieve results, either civilian or military, heretofore unmatched in the history of injection molding.

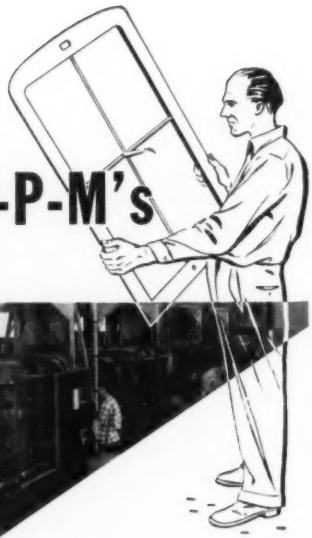
*General Manager, Amos Molded Plastics, Edinburg, Indiana. Offices: New York, Chicago, Detroit, Philadelphia, Sec.-Treas. Amos-Thompson Corporation. Member of Society of the Plastics Industry, Inc., and Society of Plastic Engineers.

**Sales Manager in charge of engineering, Amos Molded Plastics. Charter member of Society of the Plastics Industry, Inc., Society of Plastic Engineers, Plastic Pioneers, and the American Society of Tool Engineers.

(ADVERTISEMENT)

General American

installs FIVE 60 oz. H-P-M's



the leading "big" molders choose H-P-M's...here's why...

● Yes, there's a reason why H-P-M supplied over 50% of the plastics industry's big injection machines in 1950! More quality parts out the molder's shipping door is the basic reason for such wide acceptance of the H-P-M "60". These five H-P-M giants at G. A. T. X. are setting new records in big refrigerator parts . . . one-piece breaker frames, freezer chest doors, humidifier drawers.

Molders like H-P-M's hydraulic power system out in the open for easy accessibility . . . plenty of clamp pressure (1000-tons) . . . big mold space (40"x60") . . . lots of daylight (60") . . . enough stroke for those deep draw jobs (36"). That's why G. E., Ideal, Santay, Federal Tool, Cruver, Consolidated Molded, Associated, Victory and other big molders have installed H-P-M "60s".

Remember . . . H-P-M's new 60 oz. is designed for easy conversion to 200 oz. pre-plasticizing. Write for specifications.

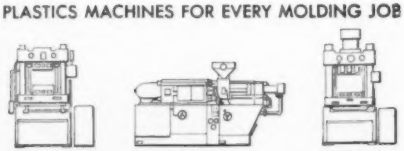
H-P-M STANDARD SIZES—9, 16, 32, 60 & 200 oz. CAPACITIES.

HPM

PLASTICS MACHINES FOR EVERY MOLDING JOB

THE HYDRAULIC PRESS MFG. CO.

1010 MARION RD., MT. GILEAD, OHIO, U. S. A.



COMPRESSION INJECTION TRANSFER

Know Your Plastics

IT MAY MEAN BETTER AND FASTER PRODUCTION... AT LOWER COST

BAKELITE thermosetting Polyester Resins are combinations of styrene monomer and complex polyesters developed for contact pressure and low pressure molding, laminating, and casting. Polymerization is brought about by the use of catalysts, application of heat, or both. The resins are supplied as pale liquids in varying viscosities. They are produced in several grades, principal among which are detailed below.

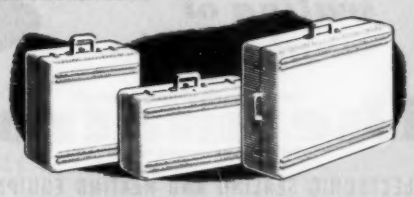
This message deals with "BAKELITE" POLYESTER RESINS

"BAKELITE" QRS-81 GENERAL PURPOSE

This general-purpose, liquid resin was developed for structural applications. It is particularly serviceable for matched-die molding because of its excellent moldability and easy flowing quality. Also readily formed with plaster, wood, and sheet-metal molds. Applicable to rubber-bag molding. Cures at room or elevated temperatures with standard catalysts. Does not precure. Retains excellent mechanical strength and electrical values at operating temperatures under 150 deg. F.

"BAKELITE" QRS-136 FLEXIBLE

This is a flexible resin sold as a non-plasticized liquid. It can be used alone for certain applications requiring a high order of toughness and flexibility, as in the production of tubing. However, it has been most useful to date as a modifier for other Polyester Resins to impart toughness and impact resistance in structural laminates and moldings. Compatible with most other Polyester Resins. Recommended for mechanical applications or where electrical insulating requirements are not critical.



"BAKELITE" QRS-17560 HIGH VISCOSITY

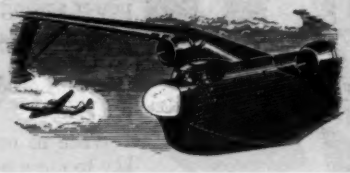
(4000-6000 cst.)

Formulated for producing castings or moldings with fewer inherent stresses and strains than with other grades of Polyester Resins. Provides non-crazing pieces of high resin content, with or without filler. Where fillers are called for, smaller quantities are required. Because of versatility of this resin it is particularly satisfactory for the production of castings made from glass-fiber preforms.

"BAKELITE" QRS-140 MEDIUM VISCOSITY

(300-600 cst.)

This is a medium viscosity resin developed especially to meet the insulating requirements for high-frequency electronic apparatus and components (9375 megacycles per second). In electrical properties it approaches BRS-16631, so widely used in World War II for radomes and other vital equipment. It is easier to handle than BRS-16631 because of improved moldability.



The development of BAKELITE Polyester Resins for molding reinforced plastics is a continuing operation of the Bakelite Laboratories. Formulations can be varied almost infinitely, and tailored to your particular jobs. Some of these jobs . . . chiefly with glass fiber cloth or mat . . . include boat hulls, radomes, refrigerator panels, housings, luggage, to which they give light weight, high impact, tensile, and flexural strength, and resistance to moisture, many chemicals, and heat. Superior electrical insulation values are attainable. For instance, laminates made with these resins have relatively low power factors throughout the 60 to 10^6 cycles range. They eliminate the need for costly molds, high heat, and high pressures. Engineers and designers interested in BAKELITE Polyester Resins are urged to outline their needs *in fullest detail* for a thorough, confidential analysis. Write Dept. BV-13.

BAKELITE
TRADE-MARK
POLYESTER RESINS

BAKELITE COMPANY
A Division of
Union Carbide and Carbon Corporation
UCC
30 East 42nd Street, New York 17, N. Y.

Do Your Seams Have . . .

*SA?

THE "WELD" DRESSED GIRL'S SEAL OF APPROVAL

for better sealing of vinyl plastics

Thermatron

ELECTRONIC SEALING AND HEATING EQUIPMENT

Almost any plastic product can be seamed faster, cheaper, better on the THERMATRON. In fact the list is longer than a roll of vinyl. A few are shown above. . . . The "Weld" Dressed Girl is sitting on a beach chair cushion of vinyl plastic, and wearing shoes that are THERMATRON welded.

PRODUCTS FABRICATED FROM VINYL *look* smarter, have more "sell" when they are seamed the modern electronic way. THERMATRON *welds*, doesn't *stitch* plastics; produces controlled shape and fit, and seams that outlast the material itself. . . . Eliminates weakening perforations. THERMATRON seams are airtight and watertight.

The time-tested THERMATRON electronic welding process is a production man's delight because it does more in seconds with less labor than the power sewing machine does in endless minutes.

In these days of rising costs and manpower shortages it should be refreshing to know there is a technological advance in *your* industry that can speed up *your* production at less cost – and give you a sturdier product.

Write us now. THERMATRON engineers may hold the key to more profitable production in *your* plant. . . . No obligation, of course. We'd like to send you a copy of our bulletin No. 58.

Standard THERMATRON models from ¼ KW to 6 KW weld vinyl from .002" to .080", serving most requirements—or we can build to special application. Equipment also available for sealing cellulose acetate, and for electronic gluing of furniture and other wood products.

Thermatron DIVISION

RADIO RECEPTOR COMPANY, INC.

Since 1922 in Radio and Electronics

Sales Dept.: 251 W. 19th St., New York 11, N. Y. • Factory: 84 N. 9th St., Brooklyn 11, N. Y.

NIXON PLASTICS

Sheets • Rods • Tubes

cellulose acetate
cellulose nitrate
ethyl cellulose
cellulose acetate butyrate

Rigid Vinyl Sheeting

Molding Powder

cellulose acetate
ethyl cellulose

NIXON NITRATION WORKS

Founded 1898

NIXON • NEW JERSEY

Home Office: NIXON, NEW JERSEY
Phone: New Brunswick 2-1121
New York Extension WOrth 4-5291

M. BREITKOPF W. B. SAVAGE W. A. OLSEN
W. G. TUCKER M. W. PETERS C. E. O'NEAL

Chicago, Ill.
F. W. LINDAHL
MRS. M. FAHRINGER
510 North Dearborn Avenue
Phone: Michigan 2363

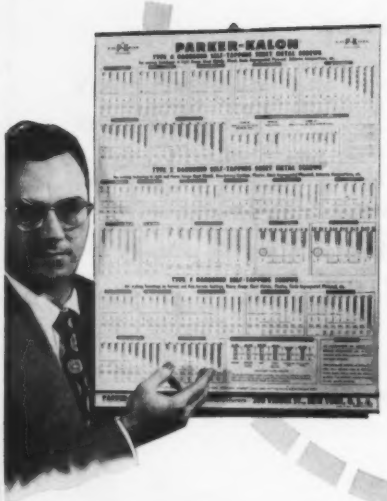
St. Louis, Mo.
C. B. JUDD
403 Louderman Bldg.
317 North 11th St.
Phone: Chestnut 8495

New England
Cranston, R.I.
G. L. LOTZ
57 Garden City Dr., Apt. 9
Phone: Stuart 1-4385

Leominster, Mass.
A. F. PERRY CO.
A. F. PERRY
C. A. DOVIDIO
Box 214
Phone: Leominster 1011-2156

2. ***P-K'S SELF-TAPPING SCREW BULLETIN***
Explains the "why, where and when" of using Self-tapping Screws; 48 pages, in all, of complete descriptions, of valuable application information, including case histories showing how other manufacturers licked assembly problems similar to yours.

3. ***P-K ENGINEERING STANDARDS***
A 48-page bulletin giving standard head and thread dimensions of P-K Screws, plating finishes, and other useful data. Clear, complete—prized by designers and draftsmen.



1. ***THE NEW P-K SCREW SIZE CHART***
Illustrates in actual sizes standard P-K Self-tapping Screws and other fasteners in the P-K line—makes it easy for you to select the proper size—to avoid errors, returns and exchanges.

P-K saves you time before you start production . . .

HERE ARE THREE *of many* REASONS WHY

The time-saving P-K* Screws effect in assembly is well-known. By using them, you can skip tapping, avoid inserts in plastics, and work much faster than with bolts, rivets, and other common fasteners.

But P-K saves you a lot of time, too, in selecting and specifying Self-tapping Screws from the multiplicity of types, sizes, and head styles, while the job is still in the design stage, *before* production begins.

Simplifying your job of digging for data is a continuing project at P-K. P-K service literature is recognized throughout industry to be exceptionally clear, concise, and keyed exactly to assembly planners' needs.

It will help you more than ever today, when your operations must be adjusted to limited supplies. Remember, too, that P-K Assembly Engineers are ready to apply an unequaled experience to your most difficult problems of planning and procurement. Parker-Kalon Corporation, 200 Varick Street, New York 14.

IF IT'S P-K IT'S O.K.
TRADE MARK REG. U.S. PAT. OFF.

*TRADE MARKS REG. U.S. PAT. OFF.

The Original

PARKER-KALON* SELF-TAPPING SCREWS

A TYPE AND SIZE FOR EVERY METAL AND PLASTIC ASSEMBLY

HOW TO CALL AN END TO PHENOLIC MOLDING PROBLEMS

Call on Borden's DURITE.

The handset above is a good example of special properties in DURITE phenolic molding compounds created by Borden engineers to meet customers' special requirements. And a tough order it was . . . meet rigid government specifications for high impact strength, yet maintain sufficient resilience to withstand flexural loads.

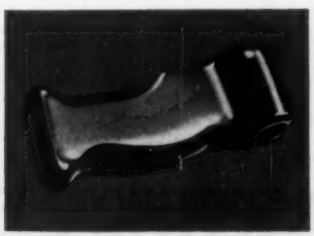
This product molded of DURITE withstands sanding and buffing, resists body acids without dulling. For applications of this nature, both military and civilian, specify Borden's DURITE GP-120, Black.

In DURITE, Borden gives you the special properties you need, in the degree you want, by skillful combining of cellulosic, carbonaceous and mineral fillers with the resin base. Address your molding problems requiring Phenolic Molding Compounds to The Borden Company, Chemical Division, Dept. MP-41, 350 Madison Ave., New York 17, N. Y.

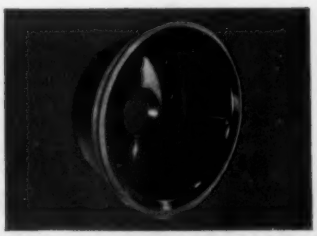
Borden's DURITE

Molding Powders • Bonding Resins • Cements

Lustrous finish, high impact, dimensional stability are special properties of the Borden's DURITE phenolic used in this instrument housing.



Highest impact, good finish, uniform density are special properties of the Borden's DURITE phenolic used in this good-looking gun grip.



Improved impact coupled with good heat resistance are special properties of the Borden's DURITE phenolic used in this diamond wheel core.

THE MOST ECONOMICAL MODERN AUTO-CONTROLLED MOLDING PRESS

BIPEL

Compression/Transfer Models Covering 20-300 Ton Range

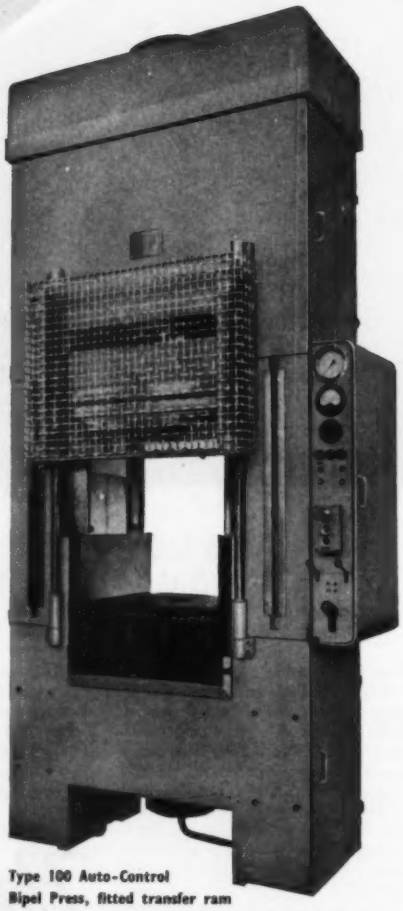
Designed originally for the molding division of the B.I.P. Group, originators of aminoplastic molding powders in Great Britain, these presses can be supplied either with individual drive contained within the press frame or preferably to operate in groups of up to 12 from a special 1000-p.s.i. pumping unit. Choice of operating pressures at each press: 1000, 2000 or 3000-p.s.i. from a novel built-in intensifier.

Completely flexible cycle controller eliminates the human factor, gives any conceivable molding routine and ensures constant product quality.

Tested for the last three years on a 24 hours a day schedule, these presses have shown a great reduction in rejects and operating costs.

There are three models:—

Type 40: Pressure range 20 - 60 tons
Type 100: Pressure range 50 - 150 tons
Type 200: Pressure range 100 - 300 tons



Type 100 Auto-Control Bipel Press, fitted transfer ram

BRIEF SPECIFICATIONS

FRAMES: Heavy steel plate, electrically welded, stress relieved, enclosing completely all hydraulic and electrical equipment. Water-cooled platens.

RAMS: Annulus type, hard chromed, fitted with C.I. piston rings.

HYDRAULIC SYSTEM: 1000-p.s.i. ring main supplied from self-contained unit embodying air-loaded accumulator and special B.I.P. unloading valve *which cannot by-pass fluid under pressure but always unloads.* Working pressures of 2000 to 3000-p.s.i. are obtained by intensifier built into pre.s.

AUTOMATIC CONTROL: Pneumatically operated. Can reproduce with precision any molding cycle that can be performed manually.

ELECTRICAL GEAR: All built-in including thermostatic control for platens and molds.

GUARDS AND CHOCKS: Interlocked and automatically operated from sequence controller.

NOT JUST A PRESS, BUT ENGINEERED IN EVERY DETAIL AS A PRECISION MACHINE TOOL

B·I·P GROUP

B.I.P. ENGINEERING LTD., ALDRIDGE ROAD, STREETLY, STAFFS, ENGLAND

OURS is an industry without an "all-purpose" product. Your requirements may be *similar* to another's. But even a slight variation can demand completely different characteristics in materials you use in fabricating, compounding or processing.

That's the reason for Flintkote's "two-edged" production policy.

We make a wide line of standard products: adhesives, cements, laminants, impregnants, sizings, coatings and the like. Many plant operators find just what they need among this group.

But as to your needs . . . our technicians will welcome the opportunity to work with your staff or independently to develop exactly the special product you require.

In short, you can be sure with Flintkote. Each one of our many standard products is *custom-formulated* and accurately compounded to meet different, given sets of conditions. And for your *special* needs . . . whether a drum or a carload . . . a letter will put our research, development and production facilities at your disposal. Write today.

THE FLINTKOTE COMPANY
Industrial Products Division
30 Rockefeller Plaza, New York 20, N. Y.
Atlanta • Boston • Chicago Heights
Detroit • Los Angeles • New Orleans
Washington • Toronto • Montreal

FLINTKOTE RESEARCH LABORATORY

FLINTKOTE
Products for Industry

You can double the life of most vinyl compounds...

with DYPHOS

"Dutch Boy" Stabilizers

PRODUCT	USE
TRI-BASE (Tribasic Lead Sulphate)	Electrical and other compounds requiring high heat-stability
TRI-BASE E (Basic Lead Silicate Sulphate Complex)	Low volume cost insulation
DS-207 (Dibasic Lead Stearate)	Sheeting, extrusion and molded compounds, i.e., insulated wire and vinyl phonograph records
PLUMB-O-SIL A (Co-precipitate of Lead Orthosilicate and Silica Gel)	Translucent and colored sheeting and upholstery stocks
PLUMB-O-SIL B (Co-precipitate of Lead Orthosilicate and Silica Gel)	Translucent film and sheeting, belting
PLUMB-O-SIL C (Co-precipitate of Lead Orthosilicate and Silica Gel)	High grade insulated wire and sheeting
DYTHAL (Di-basic Lead Phthalate)	General purpose stabilizer for heat and light
DYPHOS (Di-basic Lead Phosphite)	Excellent for heat and light in all opaque stocks, including Plastisols and Organosols
NORMASAL (Normal Lead Salicylate)	Vinyl flooring and other compounds requiring good light-stability

Dutch Boy* CHEMICALS

*Trademarks Reg. U. S. Pat. Off.

Greatly increased service life for your opaque vinyl products—unequalled light- and heat-stability—excellent color retention—lasting flexibility . . . these are advantages of stabilizing with "Dutch Boy" DYPHOS.

"Dutch Boy" DYPHOS is effective in upgrading quality because it has all four properties of the ideal stabilizer:

(1) Acid acceptor; (2) Reactive molecule; (3) Anti-oxidant; (4) Ultra-violet light screening agents.

This is shown by accelerated tests in the laboratory and by actual outdoor exposure tests.

Most vinyl formulations with DYPHOS show a *useful life at least twice* that of similar compounds using other stabilizers.

DYPHOS is recommended for high-quality vinyl compounds, including plastisols; also for systems using chloroparaffins as secondary plasticizers.

For complete factual data on DYPHOS and other "Dutch Boy" chemicals . . . for technical assistance in evaluating their use in your operations . . . write us.

NATIONAL LEAD COMPANY
111 Broadway, New York 6, N. Y.

Colorful Living Begins on a Calender

An exciting new era of color has been brought to America; and modern plastics have contributed greatly to its advance. Gossamer-light but sturdy table covers and shower curtains, lovely floral drapes, gleaming dinnerware, upholstery coverings in the clear, rich tones of woven fabrics—science and skills have been developed to produce them all in plastics. No other medium offers the designer such range and richness of color, combined with other properties required for fabrication in industry.

For over 60 years Adamson United has had an important part in perfecting modern equipment and methods for the satisfactory and economical production of calendered materials.

If your plans call for new installations either of single units or of complete electronically controlled trains with all accessories, consult us. Our development, designing and manufacturing facilities are at your service.

SINCE 1892

. . . leaders in the Development, Design and Manufacture of Basic Machinery and Processes for Rubber and Plastics

Adamson United Company

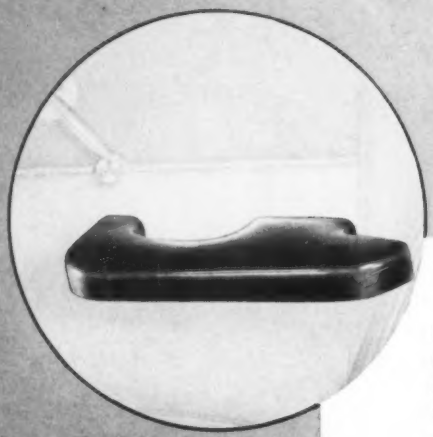
730 Carroll Street

Akron, Ohio

Sales Offices In Principal Cities

Subsidiary of United Engineering and Foundry Company

Plants at: Pittsburgh • Vandergrift • New Castle • Youngstown • Canton



Skillful Moldings by Industrial Plastics...

How Industrial Met Requirements

for The Studebaker Corp., South Bend, Ind.

Product: REAR ARM REST COVER

Non-rigid vinyl was chosen for this arm rest application because of its resistance to wear and chemicals, and its excellent resiliency. The method of assembling the cover on the bracket presented an undercut groove problem which non-rigid vinyl also solved. The die was developed with a floating core to facilitate stripping the arm rest from the core. Proper choice of gate size and location was necessary, due to the large area of thin walls that had to be filled. All of these factors proved paramount. This job is a typical example of how recourse to past engineering and molding experience can produce satisfactory end results.

In the course of years, many leading manufacturing organizations have learned to depend upon the design and molding services of Industrial Plastics for prompt, economical fulfillment of their requirements involving the use of plastics. Whenever your company needs this sort of service, ask us to confirm what we can do for you. No obligation.

Serving the Greatest Names in Industry

Industrial Plastics Co.

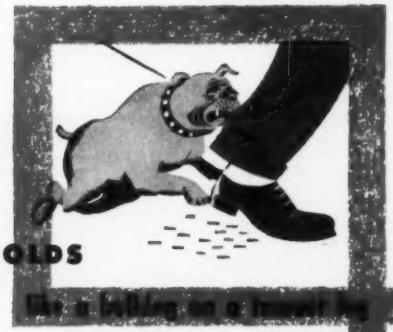
A Division of INDUSTRIAL ABRASIVES INC

3724 West 38th Street **Chicago 32, Illinois**

Ever Ready MEANS Labels

For thirty-five long years, American businessmen have been saying "Ever Ready" whenever they want labels. Ungummed labels. Gummed labels. Roll labels. Heat seal labels. Lots of labels. Or a few labels.

Ever Ready Now Introduces



RED E STIK*

pressure sensitive labels

If . . . you make a product that is hard to label . . . .

or one that requires a removable label . . . .

use RED E STIK pressure sensitive labels

It's only natural for Ever Ready to be the one to bring a self-adhesive label that meets your needs best . . . that sticks to any non-porous surface — plastic, film, glass, metal, wood . . . that peels off instantly when you want it to . . . that can be machine fed for lightning-like application.

Now Ever Ready will solve your pressure sensitive labeling problems, develop label designs, provide the mechanical help you need. You can't go wrong if you use Ever Ready Red-E-Stik labels for fast, better looking labels at lower cost. Ask for the facts today.

*T.M.

EVER READY Label

357-361 Cortlandt Street, Belleville 9, New Jersey

New York Sales Office:
137 East 25th Street, New York ► 10 MILES FROM BELLEVILLE.

All-Around "Expert" in finishing plastics

● Made specifically for sanding plastics, CARBORUNDUM's Waterproof Cloth Belts add an "expert's" touch in turning out an increased volume of uniformly high quality work at minimum cost. Their cutting action with water coolant is cool, clean and fast...no frictional heat to burn or distort thermoplastics. With "wet stretch" retarded, time is not wasted for belt tensioning adjustments. Because plastic dust is wet down, an occupational hazard is also avoided. Your CARBORUNDUM representative can help you realize additional benefits through correct selection of the right grit size for individual job requirements.

Only CARBORUNDUM

TRADE MARK

makes ALL Abrasive Products ...to give you the proper ONE

"Carborundum" is a registered trademark which indicates manufacture by The Carborundum Company, Niagara Falls, N.Y.

injection molding machines by DE MATTIA

—the standard of MOLDING EFFICIENCY

The De Mattia Model C-1, illustrated, incorporates the ultimate in design and performance in injection molding machines. Exceptionally heavy tension members, high mold clamping pressure and uniform hydraulic pressure on the entire die face are just a few of the many De Mattia features that increase molding efficiency. Like all De Mattia equipment, Model C-1 is ruggedly constructed to provide long service in continuous use — the kind of service that has made the name De Mattia a standard for reliability throughout the industry.

DE MATTIA HORIZONTAL MODEL C-1 SPECIFICATIONS

Material per Injection — 12 ozs. • Plasticized Material per hour — 130 lbs. • Feed Hopper Capacity — 60 lbs. • Injection Piston Diameter — 2¾" • Injection Piston Stroke — 11½" • Hydraulic Injection Cylinder Bore — 13" • Pressure on Material — 22,500 PSI • Mold Closing Pressure — 400 Tons • Max. Mold Size — 18" x 25" • Max. Daylight — 30" • Min. Die Space — 6" • Max. Stroke — 24" • Oil Pump Capacity — 60 GPM @ 1000 PSI, Max. • Motor — 30 HP • Injection Stroke Time, for Filling Mold — 3.0 Secs. • Speed of Injection Piston, Forward — 120" per Min. • Heating Cylinder — 13,000 Watts • Height of Machine, Overall — 72" • Floor Space Required — 172" x 42" • Approx. Weight — 10 Tons.

SEND FOR NEW DE MATTIA CATALOG

It contains complete information and specifications on De Mattia Horizontal and Vertical Molding Machines and De Mattia Scrap Grinders.

MOLDING PRESSES • SCRAP GRINDERS • MOLD MAKING

DE MATTIA MACHINE and TOOL CO.

NEW YORK SALES OFFICE: 50 CHURCH ST. — CABLE ADDRESS: BROMACH, N. Y.
MIDWEST SALES OFFICE: 189 WEST MADISON ST., CHICAGO 2, ILLINOIS

Chemicals you live by

DIAMOND ALKALI'S SPECIAL CHEMICALS FOR PLASTICS COMPOUNDING

CHLOROWAX* 40	**Liquid chlorinated paraffin containing 40% chlorine by weight. Inert, nontoxic, soluble in wide variety of organic solvents.**	Highly suitable as a co-plasticizer in vinyl compounds. Lowers compounding costs at no sacrifice in quality.
CHLOROWAX* 70	**Resinous chlorinated paraffin containing 70% chlorine by weight. Cream-colored nontoxic resin. Soluble in most organic solvents. Highly resistant to burning.**	Useful as processing aid when compounded with rigid plastics, since it lowers softening point.
SURFEX*	**Precipitated calcium carbonate. Particle size 1 to 5 microns. Resin-coated. Low oil absorption (20-22 cc/100 grams).**	Useful as extender in vinyl compounds, lowering compounding costs. Contributes excellent color and light stability to organosols and plastisols.
MULTIFEX* MM	**Ultra-fine precipitated calcium carbonate. Particle size .05 to .06 microns. Uncoated.**	Used in vinyl compounds for extrusion and floor tile. Contributes improved abrasion resistance and higher gloss. Reduces compounding cost with no appreciable degradation.
KALITE*	**Precipitated calcium carbonate. Particle size about 1 micron. Oil absorption 28-32 cc. per 100 grams. Coated with 1% fatty acid.**	Used extensively in calendered 20-gauge film such as vinyl upholstery compounds. Has low oil absorption. Excellent calendering properties.

*®

DIAMOND CHEMICALS FOR PLASTICS COMPOUNDING

DIAMOND ALKALI COMPANY • CLEVELAND 14, OHIO

DIAMOND ALKALI CHEMICALS

by

Swedlow

Among other notable developments in which SWEDLOW skill in acrylics had a share are the latest achievements of . . .

- **Boeing Airplane Co.**
- **Hiller Helicopters, Inc.**
- **Lockheed Aircraft Corp.**
- **McDonnell Aircraft Corp.**
- **North American Aviation, Inc.**
- **Northrop Aircraft, Inc.**

The Consolidated-Vultee B-36, world's largest bomber, can carry a heavier load of bombs for a greater distance at a higher altitude than any other aircraft in existence.

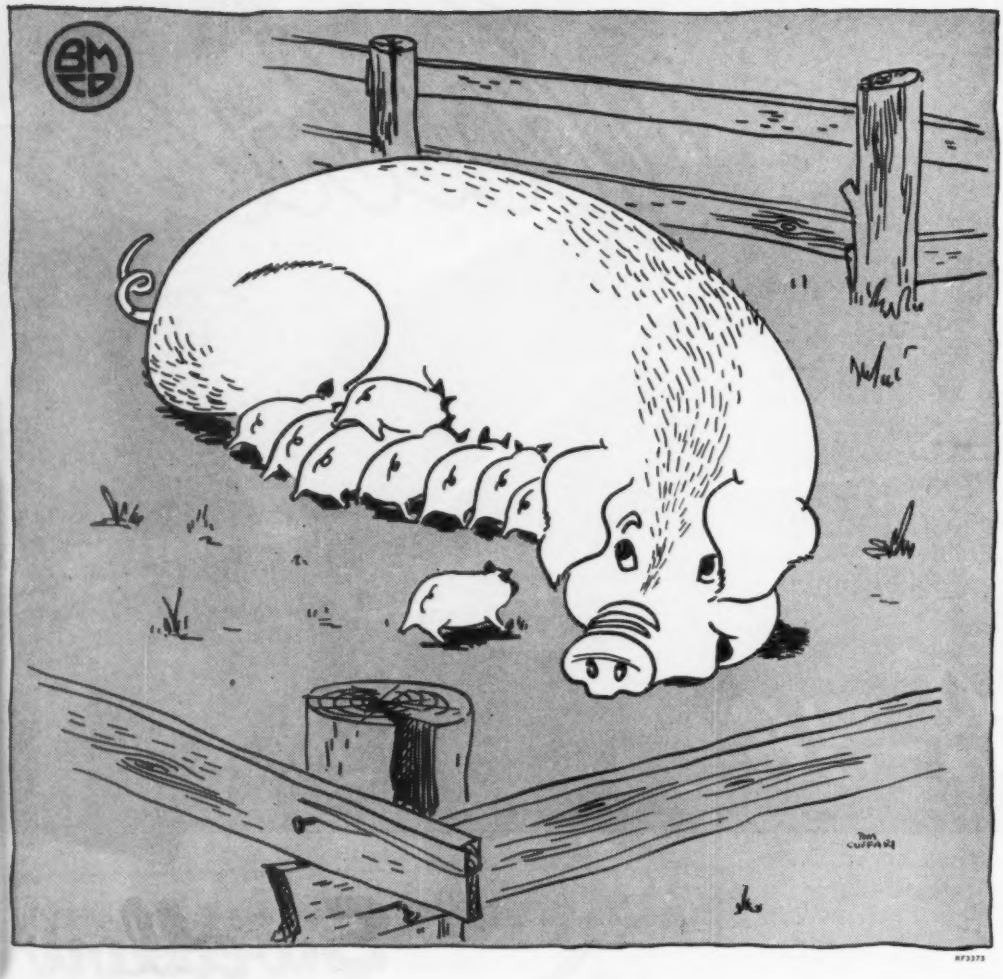
This superlative weapon in the arsenal of democracy is a masterpiece of precision manufacture. Every component part must achieve a peak of perfection worthy of the great role the Convair B-36 is to play in our armed forces.

SWEDLOW was selected to produce the laminated acrylic enclosures for the B-36 because of a 15-year record of leadership in acrylic fabrication, specializing in aircraft applications for the Air Force and Navy of the United States.

● ***We also serve the industry with improved fuel cell backings in accordance with applicable Air Force, Navy and customer specifications.***

Swedlow
PLASTICS CO.

LOS ANGELES, CALIFORNIA · TORRANCE, CALIF.



Talk About Free Flowing Efficiency!

Cool, detached planning . . . centered on the problem . . . backed by seasoned experience and trained skill in producing successful products. A combination of factors that is your assurance of free flowing efficiency.

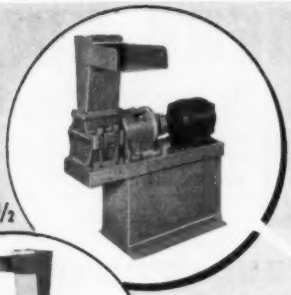
That's what we here at Boonton offer to progressive manufacturers who appreciate value plus reliability and on-schedule deliveries in their plastics molded parts.

We have on tap the imagination, skill, resources and know-how of an organization that has over 30-years experience in the field of plastics molding . . . with time for you!

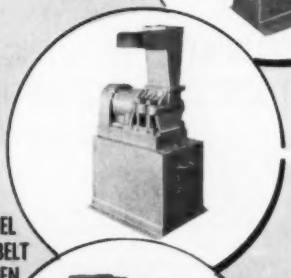
We think you'll be interested in our work and methods—as applied to your products. You can of course, *and we really mean it*, work and talk with us without obligation—and without starting rumors. Let's get together.

BOONTON MOLDING CO.

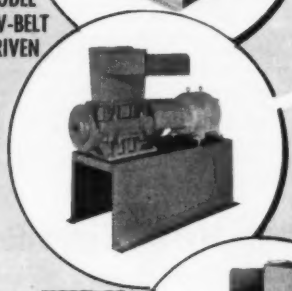
BOONTON, NEW JERSEY N. Y. Office—Chanin Bldg., 122 East 42nd Street, Murray Hill 6-8540



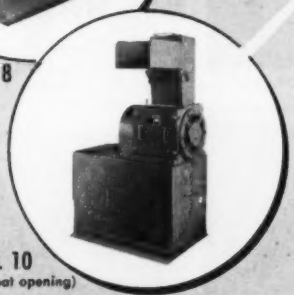
MODEL ½



MODEL ½ V-BELT DRIVEN



MODEL 18



MODEL 10
(6" x 10" throat opening)

There's a CUMBERLAND GRANULATOR that's *RIGHT FOR YOU!*

YOU'LL GRANULATE MORE ECONOMICALLY WITH A CUMBERLAND MACHINE THAT'S BUILT-FOR-THE-JOB.

Each granulating job in your plant has its own specific problems. Only a granulator that's built-for-the-job can do the job most efficiently.

Whether you granulate combs or television cabinets, brittle or elastomeric materials, there's a Cumberland granulator designed to meet your needs. Each machine is easy to operate, easy to clean, and extremely rugged.

We'll be glad to help you analyze your needs and recommend the granulator that's exactly right for you!

For more information, write for Bulletin 250.

OTHER CUMBERLAND MACHINES

NEW PREBREAKER

Cuts up radio, television cabinets and other large parts. Two machines available: Model 32 (20" x 32" throat opening); Model 24 (10" x 24" throat opening). Write for details.

ROTARY CHOPPING MACHINE

Heavy duty, rugged machine. Used for cutting thick vinylite slabs from two roll mills. Also used as large capacity pelletizer. Other applications are described in Bulletin 400.

PELLETIZING MACHINE

Smaller, companion model to Rotary Chopper. Designed specifically for use with continuous extruders. Gives efficient, trouble-free performance. Write for complete details.

CUMBERLAND Engineering Company Inc.

BUILDERS OF BETTER MACHINES FOR THE PLASTICS INDUSTRY

DEPT. 1 · BOX 216 · PROVIDENCE · RHODE ISLAND

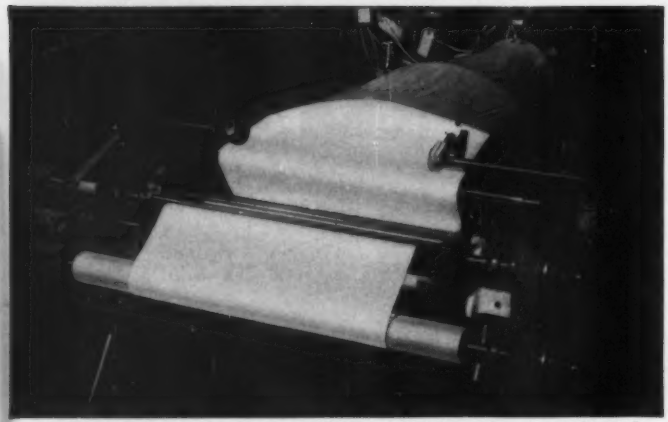
California Representative:
WEST COAST PLASTICS DISTRIBUTORS, INC.
2325 Jesse Street, Los Angeles 23, Cal.

PLASTICS MACHINERY BULLETIN

Reporting News and Machine Design Developments

IN BUSINESS TO **NRM** REDUCE YOUR COSTS

NEW! VINYL SHEETING EXTRUDED WITH LOW-COST INSTALLATION



New NRM extruder produces sheeting in thicknesses of .005″ to .015″, and a possible .020″.

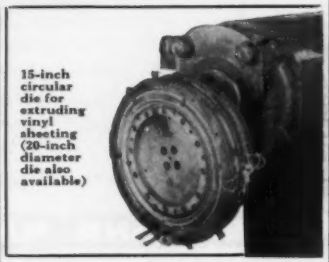
The first machine to extrude heavy-gage polyvinyl-chloride sheeting (.005″ to .015″ —.020″) has now been developed and tested at NRM's laboratories. Cost of a complete unit is but a fraction of the cost of a calender installation.

Quality of the extruded sheeting is equal or better than that of sheeting produced by calenders. Gage tolerances are broader, and output speeds less. Thus the economy of the new method can best be realized on applications where high speed and close tolerances are not imperative.

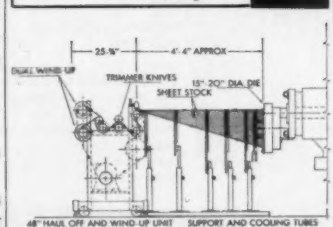
Overall length of the unit, including drive, is approximately 21 feet.

NRM also produces a unit for the extrusion of thin-wall expanded polyethylene and PVC tubing for wall thicknesses from .001″ up.

Write for complete information. Plastics Machinery Division, National Rubber Machinery Company, Akron 8, Ohio.



15-inch circular die for extruding vinyl sheeting (20-inch diameter die also available)



Extruder head and haul-off unit.

ELIMINATES PREDRYING SIMPLIFIES COMPOUNDING AND COLOR BLENDING

The new NRM two-stage single-screw extruder, which eliminates the need for initial compounding and drying, has been applied successfully for the extrusion of pre-blended wet acetate, acrylic, and polystyrene compounds to be pelletized direct at the die or in a chopper. It can now be applied for the direct extrusion of certain finished products. Thus compounds can be made to specifications quickly from a simplified inventory of basic materials such as resins, plasticizers, stabilizers, fillers and dyes, and a finished product can be obtained from one machine.

New Nylon Extruder

The NRM simplified, rugged, split-front flange arrangement holding a standard die gate or PVC crosshead can be removed readily and replaced with a band heater,

NRM 2½″ Model "50" die gate, sub-die, strainer plate and split-type front flange as removed from cylinder front end of a 2½″ extruder. A nylon crosshead or nylon die can now be bolted direct to the cylinder face.

when the small *Nylon* die or *Nylon* crosshead is bolted directly to the face of the cylinder. This avoids critical temperature variations resulting from heat losses of the flange.

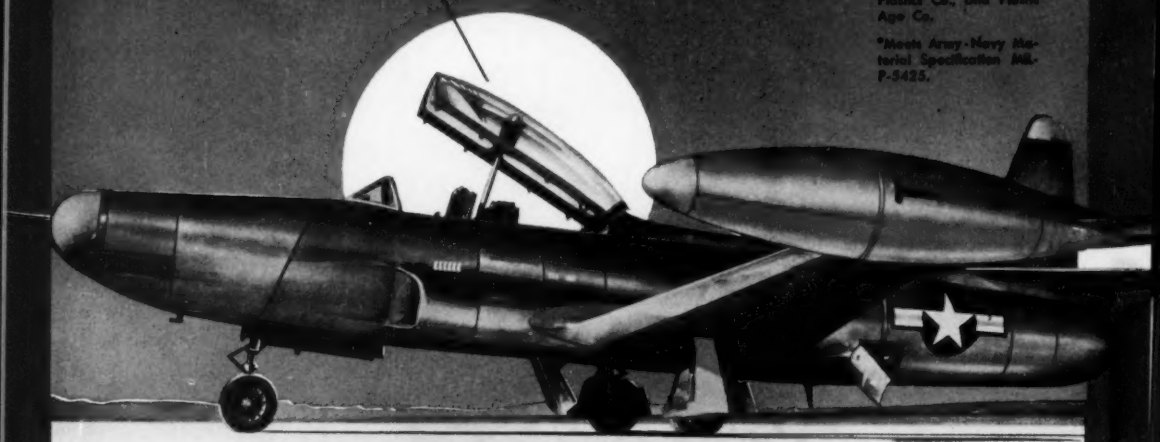
For complete details, write Plastics Machinery Division, National Rubber Machinery Company, Akron 8, Ohio.

NATIONAL RUBBER MACHINERY CO. General Offices & Engineering Laboratories Akron 8, Ohio

PLANTS at Akron and Columbiana, Ohio and Clifton, N. J.
AGENTS East: National Rubber Machinery Co., Clifton, N. J.
West: S. M. Kipp, Box 441, Pasadena 18, Calif.
EXPORT Plastics Machinery: OMNI EXPORT CORPORATION
460 4th Ave., New York 16, N. Y.

Creative Engineering

Aviation's Standard Material for Transparent Enclosures and Windows . . .



PLEXIGLAS canopy on Lockheed F-94 jet fighter. Nearly 9 feet long, the canopy is a formed single sheet of PLEXIGLAS II.* Fabrication by: Goodyear Aircraft Corp., Swedlow Plastics Co., and Plastic Age Co.

*Meets Army-Navy Material Specification MIL-P-5425.

PLEXIGLAS

The use of PLEXIGLAS on military and commercial planes is a long-standing practice in the aviation industry. For more than ten years the optical clarity, light weight, toughness, and formability of this acrylic plastic have maintained the position of PLEXIGLAS as the standard material for transparent enclosures and windows.

For the nation's newest planes, PLEXIGLAS is still the standard transparent material. PLEXIGLAS II, for example—notable for its superior heat resistance and good stress-solvent craze resistance—meets the rigorous specifications of today's high speed, high altitude aircraft. And for the elevated service requirements of planes of the future, Rohm & Haas laboratories are working to raise the standards of transparent plastics to even higher levels.

Our laboratories and service departments, with their years of experience in working with plane manufacturers, are ready to assist you on technical problems in the aviation applications of PLEXIGLAS. Complete details on properties and methods of handling are contained in our Design and Fabrication Manual —yours on request.

CHEMICALS FOR INDUSTRY

ROHM & HAAS COMPANY

WASHINGTON SQUARE, PHILADELPHIA 5, PA.

Representatives in principal foreign countries

PLEXIGLAS *is a trade-mark, Reg. U. S. Pat. Off. and in principal foreign countries.*

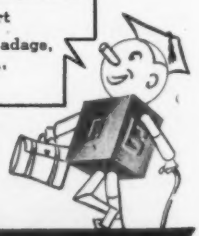
Canadian Distributor: Crystal Glass & Plastics, Ltd., 64 Duke Street, Toronto, Ontario, Canada.

"CUBEE'S" know-how...

STARTS AT THE DRAWING BOARD

When it comes to plastics, "Cubee" knows all the answers—and that know-how starts at our drawing board. This business is like an infant in many ways—the first step is the toughest. That first step is the drawing board. There we design the molds which are made in our plant. We control the job from start to finish. If your problem calls for molded plastic parts—call "Cubee." We admit we can't answer *all* your problems. But, if your problem concerns plastics—well, that's something we *do* know!

Q-B Says:
"When your problem is plastics
Don't Lose your shirt
Remember that old adage,
'Consult an Expert'!"



QUINN-BERRY CORP.
28511 West 12th Street
ERIE, PENNSYLVANIA

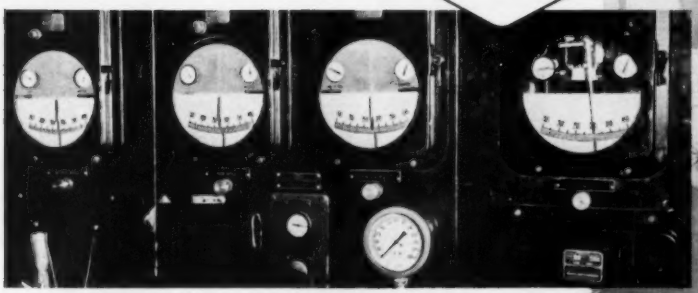
Quinn-Berry Corp.
PLASTICS

Branch Offices

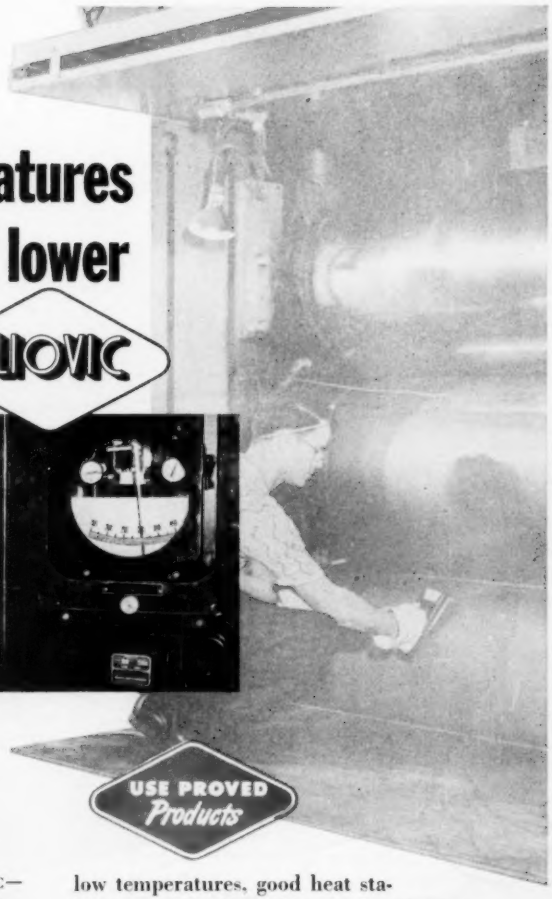
MR. HARRY R. BRETHEN
11341 Woodward Avenue
Detroit, Michigan
Townsend 8-2577

PARAGON SALES COMPANY
111 S. 22nd Street
Philadelphia 3, Pennsylvania

Process at temperatures from 20° to 40° lower with PLIOVIC



HERE'S PROOF—close-up of thermometers showing actual calendering temperatures used in processing PLIOVIC—20-40 degrees less than those used with comparable resins.



WHEN you process with PLIOVIC—Goodyear's unique, high molecular weight vinyl copolymer—you can operate at from 20° to 40° lower temperature than with resins of comparable physical properties, whether you are using mills, calenders or extruders.

In addition to the processing advantage this brings you, you can load PLIOVIC with extenders with less sacrifice of physical properties—making for economy. PLIOVIC needs less of costly and scarce plasticizers, yet gives you high-strength properties, toughness at low temperatures, good heat stability, good light stability, high resistance to flex-fatigue and excellent chemical resistance.

Films made with PLIOVIC have excellent "hand" and drape. Other current uses include flooring, hose, tubing, molded items, and organosols, for unsupported film and for fabric and paper coatings. Ask for further details, and sample for your own evaluation by writing today to:

GOODYEAR, CHEMICAL DIVISION
AKRON 16, OHIO

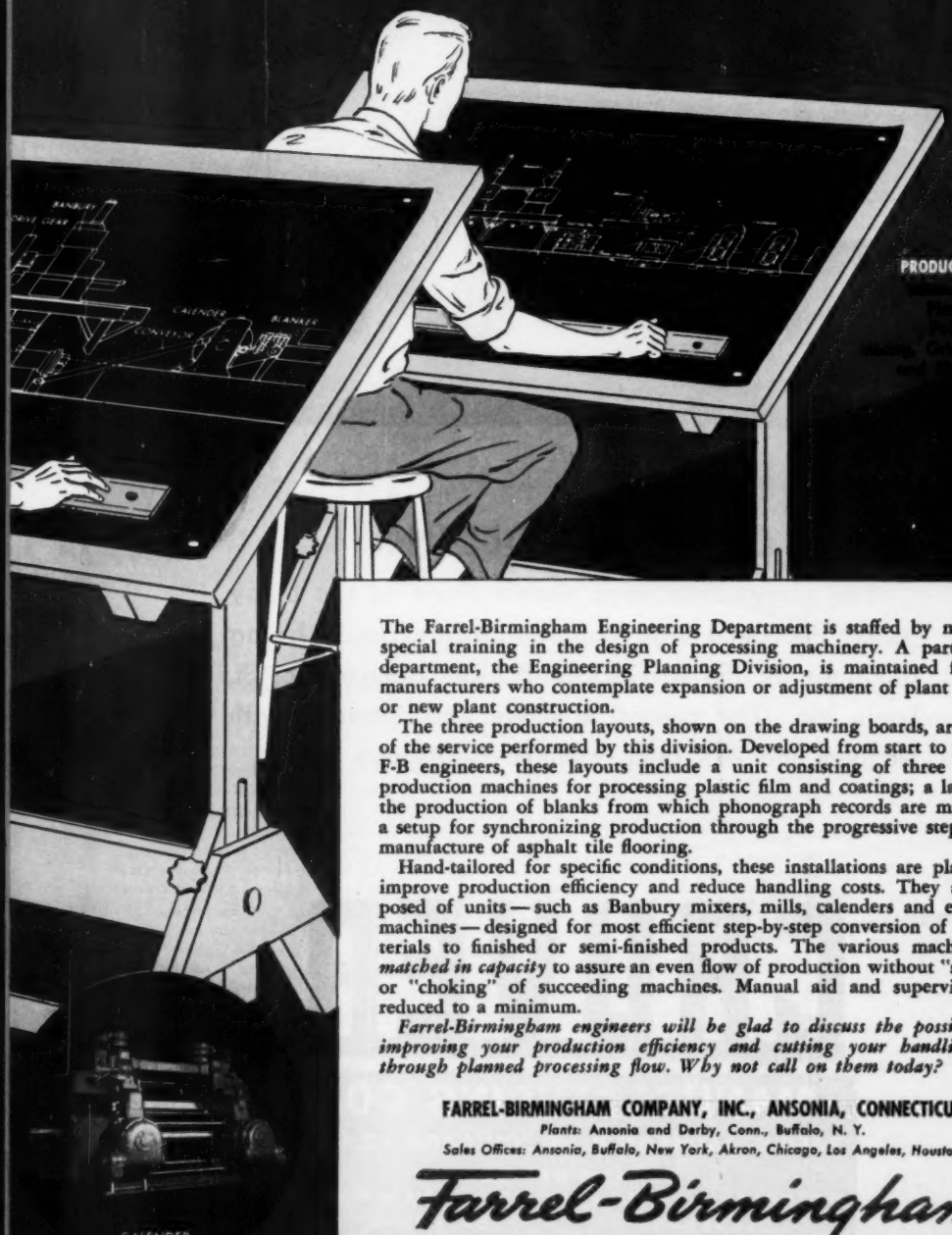
GOODYEAR

We think you'll like "THE GREATEST STORY EVER TOLD"—Every Sunday—ABC Network

Pliovic—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

FARREL-BIRMINGHAM ENGINEERS ARE READY

TO HELP SOLVE YOUR PROCESSING PROBLEM, TOO



F-B
PRODUCTION UNITS

CALENDER

The Farrel-Birmingham Engineering Department is staffed by men with special training in the design of processing machinery. A part of this department, the Engineering Planning Division, is maintained for those manufacturers who contemplate expansion or adjustment of plant facilities or new plant construction.

The three production layouts, shown on the drawing boards, are typical of the service performed by this division. Developed from start to finish by F-B engineers, these layouts include a unit consisting of three matched production machines for processing plastic film and coatings; a layout for the production of blanks from which phonograph records are made; and a setup for synchronizing production through the progressive steps in the manufacture of asphalt tile flooring.

Hand-tailored for specific conditions, these installations are planned to improve production efficiency and reduce handling costs. They are composed of units — such as Banbury mixers, mills, calenders and extruding machines — designed for most efficient step-by-step conversion of raw materials to finished or semi-finished products. The various machines are *matched in capacity* to assure an even flow of production without "starving" or "choking" of succeeding machines. Manual aid and supervision are reduced to a minimum.

Farrel-Birmingham engineers will be glad to discuss the possibility of improving your production efficiency and cutting your handling costs through planned processing flow. Why not call on them today?

FARREL-BIRMINGHAM COMPANY, INC., ANSONIA, CONNECTICUT

Plants: Ansonia and Derby, Conn., Buffalo, N. Y.

Sales Offices: Ansonia, Buffalo, New York, Akron, Chicago, Los Angeles, Houston

Farrel-Birmingham®

CUSTOM MOLDING

The above illustration shows some of the many plastic decorated sign components currently being produced for the ANHEUSER-BUSCH Company of St. Louis, Mo. The material is acrylic and decorated with lacquers and 24K gold (vacuum distillation.)

CRUVER
MANUFACTURING CO.
2460 W. JACKSON BLVD., CHICAGO 12, ILL.
BRANCH OFFICES
DETROIT MINNEAPOLIS NEW YORK
CLEVELAND ST. LOUIS

Case, case cover, vent plugs, and retainer mats of this 100 amp. hr., three-cell battery are molded from Koppers Polystyrene 8X. Manufacturer: C & D Batteries, Inc., Conshohocken, Pa. Molder: Mack Molding Co., Inc., Arlington, Vermont.

LOWER molding costs and a better product—you can have them both when you take advantage of the improved moldability of Koppers Polystyrene.

Fewer weld lines . . . improved strain pattern . . . more uniform plasticizing of material in cylinder . . . faster cycles resulting from setting at higher temperatures . . . more uniform cylinder feed . . . all are the result of the excellent molding characteristics of Koppers Polystyrene.

You'll be interested in additional technical data on the molding characteristics of Koppers Polystyrenes. Koppers Technical Service Report Number 3 gives you valuable information on the moldability of Koppers Polystyrene, based on actual field experience. Mail the coupon for your copy.

As always, we want to work with you to obtain the best results from your use of Polystyrene . . . to solve your particular molding problems (with special attention to military end uses) . . . to design new products to be made from Koppers Polystyrene when the supply situation again becomes more normal.

KOPPERS POLYSTYRENE gives you all these advantages

- Low cost
- Light weight—more pieces per pound
- Excellent dimensional stability
- Excellent electrical properties
- Heat-distortion temperature range: 165°- 200°F.
- Good chemical and moisture resistance
- Tasteless and odorless
- Unlimited color range

Koppers Perfected Plastics

Koppers Polystyrene has made Many Products Better and Many Better Products Possible

KOPPERS COMPANY, INC.

Chemical Division Pittsburgh 19, Pa.

Regional offices: New York, Boston, Philadelphia, Chicago, Detroit and Los Angeles

KOPPERS

Koppers Company, Inc.
Chemical Division, Dept. MP-4
Pittsburgh 19, Pa.

Please send us your Technical Service Report on "Moldability of Koppers Polystyrene."

Name..... Title.....

Company.....

Address.....

City..... State.....

Little

does he know...

AND little would he care, for that matter, that his favorite toy auto is made from scrap plastic left over from refrigerator freezer compartment doors.

But there's a man who *does* know and *does* care. He's the toy manufacturer who has discovered what DPi high vacuum coaters can do for his sales curve. In these coaters, he can put a beautiful metal lustre on just about any plastic product. It makes no difference if he uses a reclaimed plastic that's a bit off-color, because it's covered beautifully by its new metal coat. And cost-savings are obvious.

With the prospect of a plastics scarcity facing us, this idea of metallizing scrap plastic takes on added importance. In many cases, it may mean the difference between having and *not* having a product to put on the market!

Products already using this high vacuum metal-coating process range all the way from toys and emblems to radio housings, flashlight reflectors, and light-switch shields. The idea, naturally, also has important scientific and engineering applications these days, apart from decoration.

If you'd like to know more about the DPi coating equipment that makes all this possible, write for our new data sheet which gives the engineering details. That, and an article discussing the technique and economics of metal coating on plastics are yours for the asking. Write ***Distillation Products Industries,*** Vacuum Equipment Dept. 779 Ridge Road West, Rochester 3, N.Y. (Division of Eastman Kodak Company).

high vacuum research

and engineering

DPi

Also...vitamins A and E...distilled monoglycerides...more than 3400 Eastman Organic Chemicals for science and industry

ERIE CUSTOM MOLDED PLASTICS

ERIE RESISTOR

has the

know-how and

facilities

to make

better dies

TO produce dies for quality molding, engineers must not only know die designing and making; they must know plastics and their properties . . . how they react under the temperature and pressure to which they are subjected in the molding process.

Our own trained engineers design the dies for all jobs to be injection molded in our own new 75,000 square foot factory. Our own engineers, in conjunction with our completely equipped tool room, maintain existing dies in top operating condition, as well as constructing new molds. Several of our tool makers have been with us since ERIE pioneered custom injection molding in 1935.

Many times these facilities have been the determining factor in the successful molding of difficult items and in building the enviable reputation ERIE RESISTOR has gained through the years.

Plastics Division

ERIE RESISTOR CORP., ERIE, PA.

LONDON, ENGLAND . . . TORONTO, CANADA

For Revlon the choice is a trim Plaxpak bottle for Aquamarine Lotion Deodorant. Fingertip pressure on the colorful bottle releases exactly the desired amount of lotion. Controlled dispensing — an inherent feature of the Plaxpak bottle — is but one of many advantages. It is also light in weight, nice to the touch and smashproof. Color and decorative possibilities are unlimited. In the Plaxpak bottle, you have unique qualities to stimulate buying and to foster increased product use.

Only the best is

PRODUCTS OF OUR ASSOCIATES INCLUDE:

AUTOMATIC PACKAGING EQUIPMENT

STANDARD-KNAPP

Division of Hartford-Empire Company

PORTLAND, CONNECTICUT

GLASS MAKING MACHINES

GLASS DIVISION

Hartford-Empire Company

HARTFORD 2, CONNECTICUT

HIGH SPEED AUTOMATIC PRESSES

HENRY & WRIGHT

Division of Hartford-Empire Company

HARTFORD 5, CONNECTICUT

PREMIUM QUALITY STAMPING PRESSES

THE V & O PRESS CO.

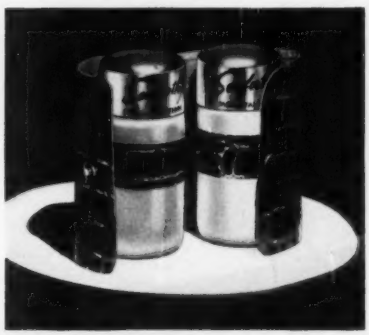
Division of Hartford-Empire Company

HUDSON, NEW YORK

For Courtley an embossed, flask-shaped Plaxpak bottle provides a handy, handsome, lightweight container for Antiseptic Body Powder. A quick squeeze produces a fine powder spray.

For Youngsters this sleek but tough airplane of Plax Polyflex* means hours and hours of outdoor fun. Polyflex is oriented polystyrene sheet — strong, easy to work, and low in cost.

For Richard Hudnut's fitted case, two light pink Plaxpak bottles provide attractive containers for Du Barry Skin Freshener and Foundation Cream. Fitted cases are smarter, lighter and more convenient with Plaxpak bottles.



For Seaforth Plaxpak bottles form a compact traveler's twosome. Light and smash-proof, the kit can be squashed into a suitcase and hauled anywhere that duty calls. Kit has Seaforth Shaving Lotion and Men's Talc.

good enough

PLAX CORPORATION
Subsidiary of Hartford-Empire Company
P.O. BOX 1019, HARTFORD 1, CONN.
In Canada, Plax Canada, Ltd., Toronto
Sales Offices: New York City, Syracuse, Philadelphia, Cincinnati and Chicago.

HELPFUL PLAX LITERATURE
Catalogs on Plaxpak bottles and other Plax products are available on request. Also available is a booklet "Fabrication of Polystyrene."

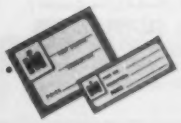
Plax blow-molded products are made under the following U. S. Pats.: 2128239, 2175053, 2175054, 2230188, 2230190, 2260750, 2283751, 2349176, 2349177, 2349178. *Reg. U.S. Pat. Off.

FOR A
TOUGH
hand labeling job

it's a MYSTIK Self-Stik label

For hard-to-label spots on hard-to-label surfaces a MYSTIK Self-Stik LABEL is the answer. Save time, speed production, cut costs with this fast, modern method for hand labeling. No moisture . . . just press on. Flexible, high stretch for complex surfaces. Water and moisture resistant . . . washable. Resistant to scuffing and delamination. Can be beautifully printed in all colors, die-cut to all shapes and sizes. Send us *your* label problems for a MYSTIK answer. Chicago Show Printing Co., 2669 N. Kildare, Chicago 39; 400 Madison Ave., New York.

CHICAGO SHOW
PRINTING COMPANY
CHICAGO • NEW YORK
Offices in Principal Cities



Identify and price parts with MYSTIK Labels.

Aluminum foil label for furniture product.

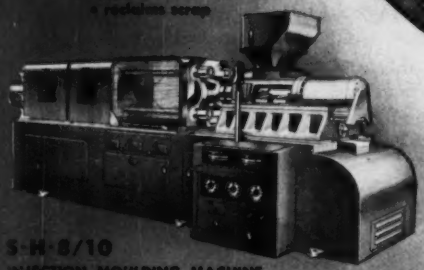
Trade mark label for vacuum ware.

Informative label for plastic table top.

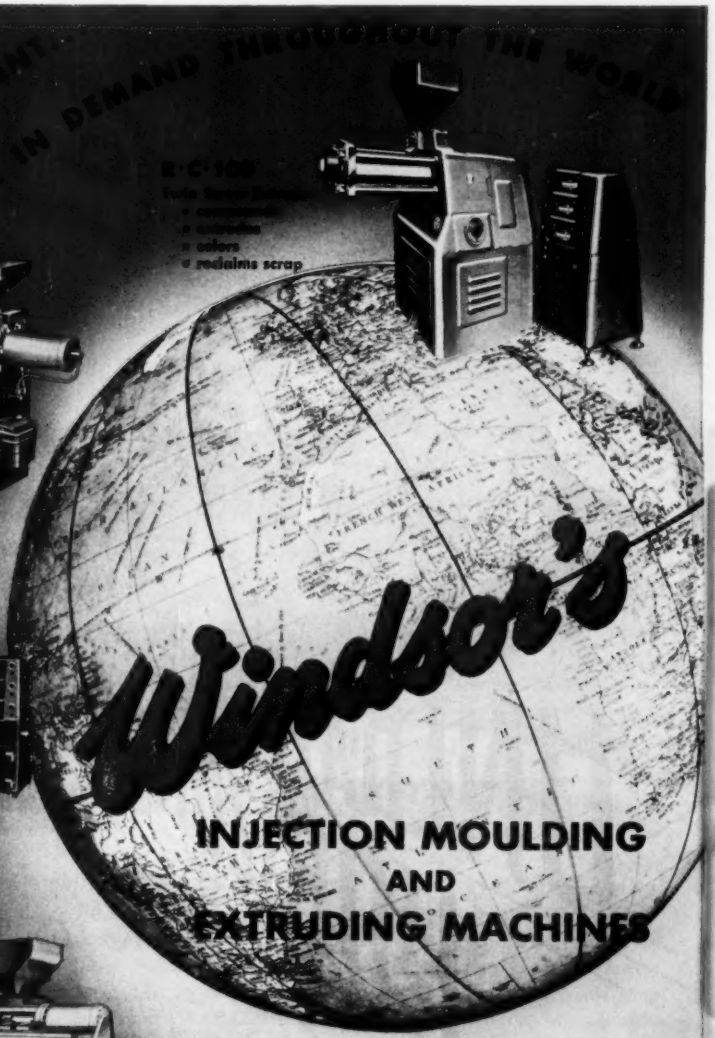
THEY'RE BRITISH · THEY'RE EFFICIENT · THEY'RE IN DEMAND THROUGHOUT THE WORLD

S·H·4
Automatic controlled cycle
INJECTION MOULDING MACHINE
produces articles weighing
up to 4 ounces per shot

R·C·200
Triple Screw Extruder
• compounds
• extrudes
• colors
• reclaims scrap



S·H·8/10
INJECTION MOULDING MACHINE
Capable of producing articles weighing
up to 10 ounces per shot



R·C·100
Twin Screw Extruder
• compounds
• extrudes
• colors
• reclaims scrap

Windsor's

INJECTION MOULDING
AND
EXTRUDING MACHINES

Plastic experts throughout the World will tell you, "WINDSOR" designs and builds Sound, Practical Machines for Profitable operation.

Plant expansion is now taking place in order to maintain world leadership and compete with the ever-developing progress of the Plastic Industry. Users the World over know the Cost-saving and Profit-making advantages of WINDSOR Plastic Machines.

R. H. WINDSOR LTD.
MANUFACTURERS UNDER L.M.P. PATENTS
16 FINSBURY SQUARE, LONDON, E.C.2 ENGLAND
Phone MONarch 8732 • Grams TECHNIMACH FINSQUARE LONDON • Cables TECHNIMACH, LONDON

MAKERS OF MOULDS, DIES & ANCILLARY EQUIPMENT

UNLIMITED HORIZONS

No bounds limit Columbia's search for the successful solution to your problems in plastics.

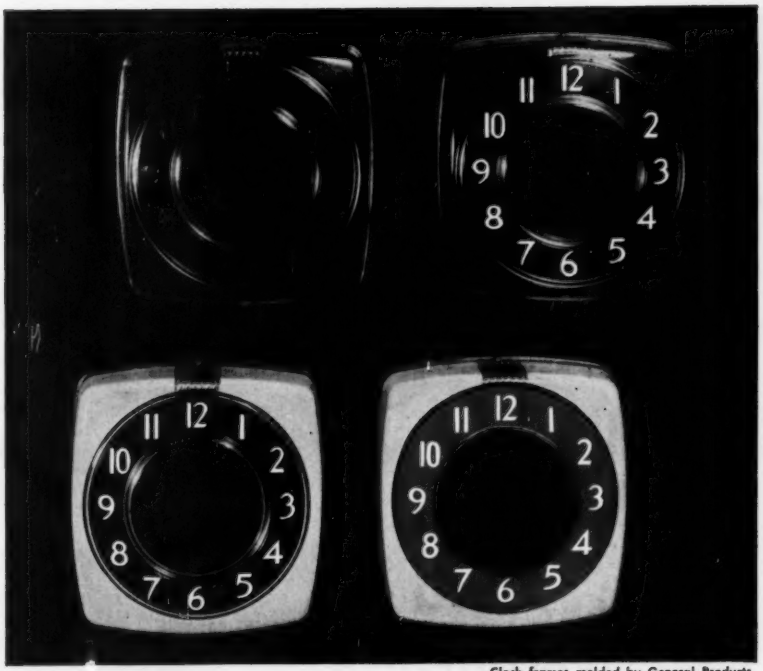
Columbia

CUSTOM MOLDERS OF PLASTIC PRODUCTS AND SPECIAL PLASTIC PACKAGING

COLUMBIA PROTEKTOSITE COMPANY, INC. • Carlstadt, New Jersey

New York Showrooms: Empire State Bldg. • West Coast Office: 380 Bayshore Blvd., San Francisco, Calif.

ONE OF AMERICA'S LEADING MANUFACTURERS OF SUN GLASSES, COMBS, BRUSHES, TOYS, HOUSEWARES



Clock frames molded by General Products Company, Inc. for Sessions Clock Company.

3 steps to multiple colors at fractional costs

with Monsanto Lustrex Styrene plastic

Sessions Clock Company applies the first rule of profitable selling... a good product, attractively made... by *lacquering* bright, "three dimensional" COLORS on the back of clock frames made of crystal Lustrex styrene plastic.

Monsanto has developed a wealth of material on lacquering, printing, decorating, metallizing, destaticization and annealing of styrene molded parts. It's in booklet form...and is *yours* for the asking.

In addition to Lustrex styrene, Monsanto produces numerous other plastics materials... in fact, the broadest range of plastics in the industry. So, whatever your materials problem, the chances are there's a Monsanto plastic that can *best* help you. Lustrex: Reg. U. S. Pat. Off.

For full information on the versatile properties and advantages of Monsanto's broad range of plastics—and for your booklet on after-treatment of molded styrene parts—mail the handy coupon. ↓

MONSANTO
CHEMICALS—PLASTICS

SERVING INDUSTRY...WHICH SERVES MANKIND

MONSANTO CHEMICAL COMPANY,
Plastics Division, Room 2604, Springfield 2, Mass.

☐ Please send me information on Monsanto's family of plastics.
☐ Please send me the booklet on, "After-treatment of Styrene Molded Parts."

Name & Title _____

Company _____

Address _____

City, Zone, State _____

PLASTICS SCRAP

bought sold reworked

We offer
the World's finest facilities for:
RECLAIMING • REPROCESSING
RECOMPOUNDING • RECOLORING

We reprocess *Your* Plastics Scrap, By-Products, Surplus for *Your* own Re-Use.
We have complete laboratory facilities for Testing, Analyzing, and Pilot Running of Customer's Materials.

OUR SERVICE

As the world's leading Plastics Scrap Reclaimers we offer the almost unlimited facilities of our vast plant to industry in these days of shortages in all basic raw-materials.

We have available over 150,000 sq. ft. of floor space devoted exclusively to the processing of plastics — virgin and scrap — resinous materials or by-products.

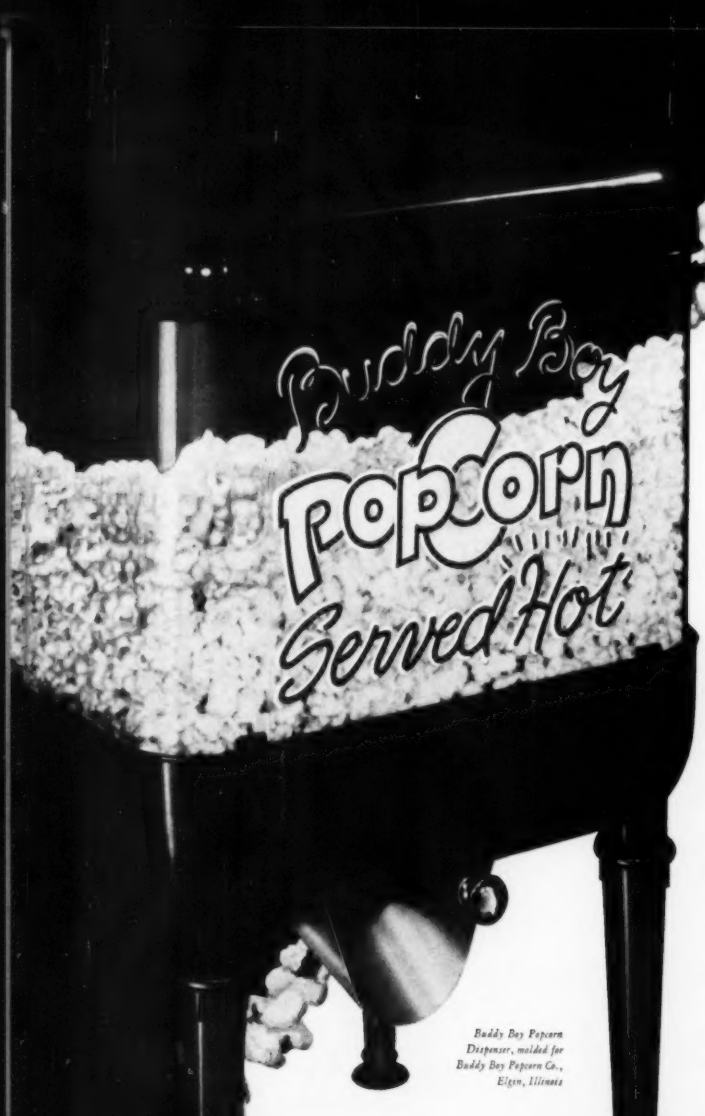
We specialize in the reduction to small particles — to your most exacting specifications — of all lumps, blocks, mill ends, bleeder waste — regardless of size and whether rigid or soft.

We also custom-compound *all* thermoplastics to your specifications.

GRANULATING • PELLETIZING
CHEMICAL FLOTATION • WASHING • CLEANING • DRYING
SEPARATION OF CONTAMINATED MATERIALS
REMOVAL OF FOREIGN MATTER
COMPOUNDING • MIXING • COLORING • EXTRUSION

UNLIMITED KILN DRYING FACILITIES

A. BAMBERGER
CORPORATION
PLASTICS MATERIALS
703 Bedford Avenue, Brooklyn 6, N. Y.
Phone: MAin 5-7150
CABLE: CHEMPROD BROOKLYN



Buddy Boy Popcorn Dispenser, molded for Buddy Boy Popcorn Co., Elgin, Illinois

Skillful Molding Helps Popcorn Sales POP

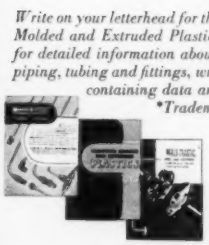
Let this Buddy Boy hot Popcorn Dispenser show you how we can serve your plastic product interests best.

Size-wise this was a big job. In spite of its size, however, the dispenser demanded ultra fine precision in both engineering and molding. The transparent pieces, being both non-warping and unsupported, are identical and required a very close fit. The legs, made hollow and in 2 pieces, needed the same fit. Transparency, edge lighting depressed from inside, and the colorful, large one piece top provided the point-of-sale punch.

Let us take the same kind of sales-minded, sound engineering look at your plastic problems today. It's help without obligation on your part.

Write on your letterhead for the new Injection Molded and Extruded Plastics Catalog. Or, for detailed information about ~~CHILO PLASTIC~~ piping, tubing and fittings, write for circulars containing data and illustrations.*

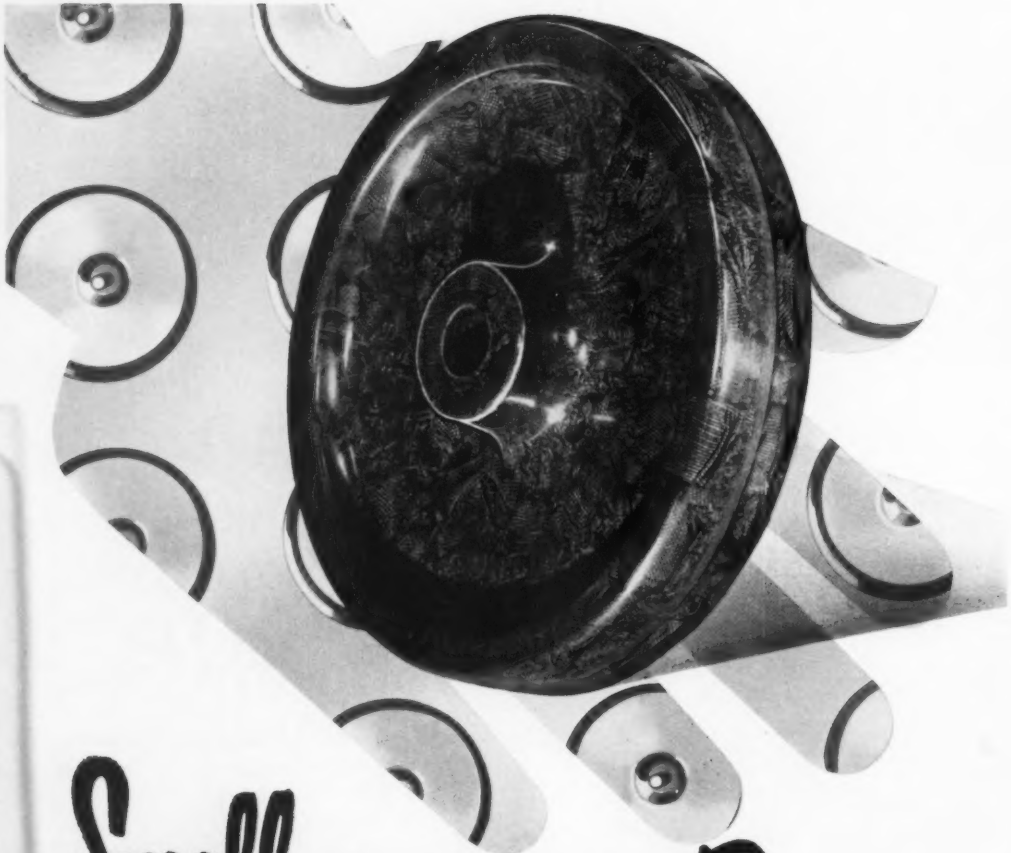
**Trademark Registered*



ELMER E. MILLS CORPORATION

INJECTION MOLDERS and EXTRUDERS of: Tenite, Lumarith, Plastacele, Fibestos, Lucite, Nylon, Plexiglas, Polystyrene, Styron, Loalin, Vinylite, Geon, Plexene, Polyethylene, Cerex, Forticel, ~~CHILO PLASTIC~~*, Saran, and other Thermoplastic Materials.

2930 NORTH ASHLAND AVENUE • CHICAGO 13, ILLINOIS



Small plastic parts molded in a Big way...

MPc is geared for volume production

When the production timetable says "rush"...and the production goal calls for molded plastic parts in large quantities, look to **MPc** for your custom molding requirements. Multiple-cavity molding on **MPc** multithousand ton presses can telescope delivery schedules. Such small but vital components as casters, knobs, tube sockets, pistol grips, insulator strips, will be unfailingly delivered in the needed quantities.

MPc dovetails neatly into your operation. Design and engineering facilities are available to you for product development. We operate our own large mold-making department. Subassemblies, involving plastic parts and other materials, can be delivered to you ready to install. Submit your plastics molding problem to Molded Products Corporation, 4535 W. Harrison St., Chicago 24, Illinois.

FREE
"DATA BOOK OF MPc FACILITIES"

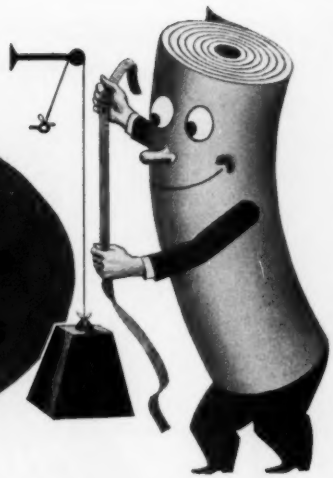
An engineering-eye view of **MPc** *press capacities and other production facilities... together with a survey of* **MPc** *special skills available for your use.*

Write for your copy

PLASTICS DIVISION
MOLDED MPc PRODUCTS
CORPORATION

UNIFORMITY

Makes the Big Difference in LAMINATION Fabrics



MT. VERNON EXTRA

Gives You Greater Fabric Uniformity

The rigid laboratory checks which control the production of Mt. Vernon Extra fabrics assure the high degree of uniformity you need for dependable lamination.

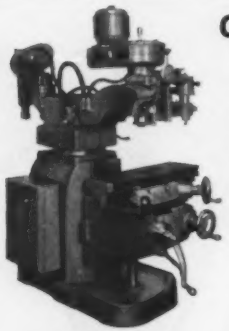
AT YOUR SERVICE

Mt. Vernon-Woodberry's staff of textile engineers is available on request to help you with your problems in development or application of industrial fabrics.

Mt. Vernon - Woodberry Mills

TURNER HALSEY COMPANY
Selling Agents
40 WORTH ST. NEW YORK

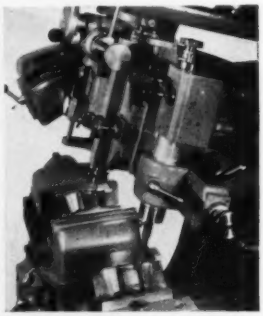
Branch Offices: Chicago • Atlanta • Baltimore
Boston • Los Angeles • Akron



CINCINNATI 8" x 18" Tool and Die Milling Machine

. . . has all the features required for quickly making accurate molds. The tracing head delicately scans the vertical profile of templates or masters, and the cutter spindle automatically follows an identical profile. Antifriction feed screws are manually controlled; provide sensitive "feel" of cutter action. Spindle carrier is universally mounted to swivel in two planes. Cutting area without repositioning—8"x18". Catalog M-1620-1.

Right: Milling a mold for a plastic toaster handle. This view shows close-ups of spindle and tracing heads.



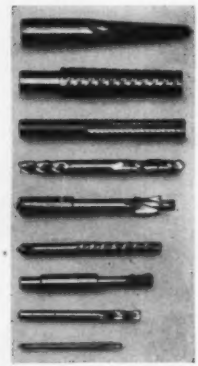
CINCINNATI Equipment

FOR THE PLASTICS INDUSTRY

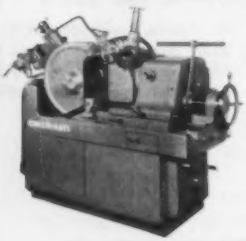
CINCINNATI Monoset Cutter and Tool Grinder

Small intricate cutters of almost any shape can be sharpened or ground from the solid, usually in one setting, on the CINCINNATI Monoset. Ball nose, tapered, and concave cutters can be ground with equal facility. Catalog M-1591.

Right: A group of cutters made and/or sharpened on CINCINNATI Monoset Cutter and Tool Grinder.

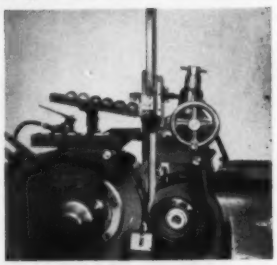


CINCINNATI FILMATIC No. 2 Centerless Grinding Machine



CINCINNATI FILMATIC Centerless Grinders are such rapid producers that they add little to the cost of plastic parts, tubes and rods. Six sizes are available: Nos. 0, 2, 3, 4, 5 and 6. The No. 2 size is recommended for grinding most plastic parts. Catalog G-574.

Right: Grinding pool balls. This machine is equipped to grind twenty sizes of pool and billiard balls.



THE CINCINNATI MILLING MACHINE CO.
CINCINNATI GRINDERS INCORPORATED
CINCINNATI 9, OHIO

CINCINNATI

CINCINNATI

CENTERTYPE GRINDING MACHINES • CENTERLESS GRINDING MACHINES
CENTERLESS LAPPING MACHINES • MICRO-CENTRIC GRINDING MACHINES
MILLING MACHINES • CUTTER SHARPENING MACHINES
BROACHING MACHINES • FLAME HARDENING MACHINES
OPTICAL PROJECTION PROFILE GRINDERS • CUTTING FLUID

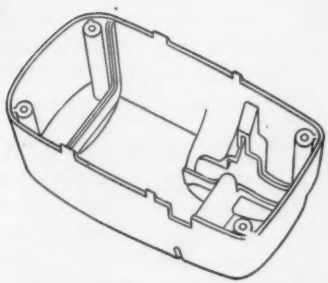
Housing molded with Hercules Cellulose Acetate Moldir Powder by Industrial Plastics Company, Chicago, Illinois.*

a double edge—IN SELLING, TOO!

HERE is something really new in kitchen tools—the Oster electric knife sharpener. Simple and easy to use, its unique double action quickly puts a factory-sharp edge on any knife, sharpening both sides of the blade at the same time.

In turn, a gleaming-white housing molded with versatile cellulose acetate gives this new Oster product a double selling edge. It *looks* better, and *works* better, too! Handsomely styled, its through-and-through color can't chip, peel, or wear off . . . it has excellent resistance to kitchen oils and greases . . . plus a hard-to-break toughness that spells a long and satisfactory service life.

Whether yours is a household or an industrial product, you may find in cellulose acetate an excellent means of giving it an edge on the competition, both in appearance and performance. Our design and technical staffs invite your inquiries.



A skillfully constructed die produced this sturdy housing with complex contours and narrow knife blade slots. In addition to other properties obtained, celluloee acetate provided a material which would not resonate under vibration—insuring quiet operation of the completed unit.

***HERCULES POWDER COMPANY** 916 Market St., Wilmington, Del.*

HERCULES Cellulosic Plastics

*TRADE-MARK *Inquiries about the new Oster electric knife sharpener should be addressed to the manufacturer, John Oster Mfg. Co., Racine, Wisc.* CP51-3

Today particularly, when industry is speeding output in the interests of national defense, Injection Molding and Die Casting offer convenient, economical and time-saving means for "delivering the goods". So, whether you're required to produce a part or a product, remember TRI-STATE—specialists in these manufacturing methods.

INJECTION MOLDING We injection mold all thermoplastics, including Styrene, Lucite, Tenite and Vinylite to exacting specifications. With our injection molding capacities from 2 to 32 ounces, and fully equipped machine shop facilities, we can maintain schedules—even in these difficult times—which will fulfill your requirements. We'll gladly help you adapt plastics to whatever applications you have in mind.

DIE CASTING Our extensive knowledge of metal and metal-working techniques enables us to design and produce long-life, accurate dies that yield clean, flawless castings. We employ the most modern production methods—have up-to-the-minute facilities for precision casting of Aluminum to 6-lb. capacity, and Zinc to 12-lb. capacity. Our services include machining, polishing and assembly.

If *you* have not already profited by the economies to be gained from Injection Molding and Die Casting—or if you are seeking a source of production employing these processes—*consult with us.* We have shown many manufacturers the way to increase output, save time and materials, produce better products at less cost. Remember, too, the strategic location of our plant expedites delivery to every part of the country.

TRI-STATE PLASTIC MOLDING CO., Inc.
America's Largest Producers of Rigid Plastic Boxes

TRI-STATE DIE CASTING CO.
Serving the Center of the Nation

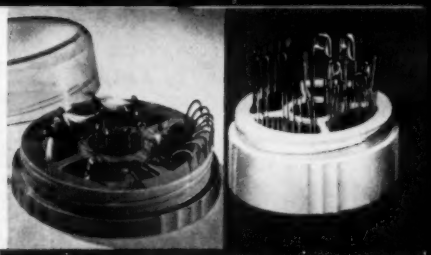
HENDERSON, KENTUCKY

NEW YORK: 12 E. 41st St. **DETROIT:** 715 Donovan Bldg. **CHICAGO:** 176 W. Adams St. **LOS ANGELES:** 10583 Holman Ave.

Set for Life!

WITH Araldite*

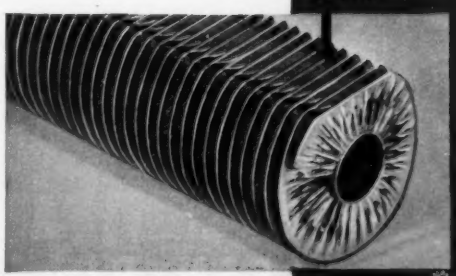
ETHOXYLINE RESINS



Magnetic Fishing Hook and Fly Bin (Norton Laboratories, Inc.) and Pin Bin of similar construction (Howard Industries, Inc.) have magnetic parts pieces securely bonded to a five compartment tray with Araldite.

World famous manufacturer of badminton rackets uses Araldite as a prime coat on ends of stainless steel shafts as a basis for a firm, durable shock-resistant bond in a supplemental cold gluing operation. Eliminates drilling and use of bolts, pins and rivets as in conventional racket construction. (Messrs. H. J. Gray & Sons Ltd.)

Araldite simply durably and economically bonds the folded edges of this "fin-tube" for heat transfer equipment into a rigid unit. The aluminum color of the fins is matched with 2% aluminum pigment in resin composition. (Edwards Engineering Company).

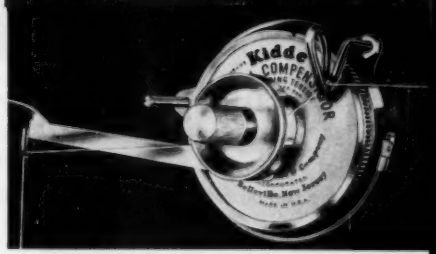


Because Araldite Resins are produced in three easy-to-use commercial forms, the exceptional properties of these new but already extensively applied resins provide fabricators seeking new, improved, simplified, time-and-money saving bonding, casting and coating mediums, with exceptional opportunities to put their ideas to work.

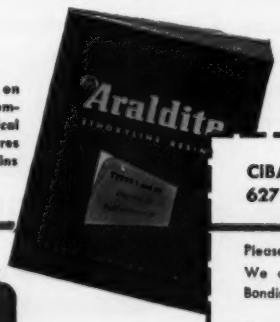
Araldite Resins harden to form thermosetting compounds without evolution of water or volatile matter . . . are characterized by their hardness, elasticity and adherence to ferrous and non-ferrous metals, ceramics, etc., without pressure . . . are tasteless, odorless, inert . . . have high dielectric strength and humidity resistance . . . and have high covering power without primers for dipping, brushing or spraying surface coatings.

Successful application experiences such as illustrated here, along with Ciba's continuing research indicate increasingly wide fields of use for Araldite Resins.

Tension Compensator with sapphire guides bonded with Araldite adhesive. (Walter Kidde Co.)



SEND THIS COUPON . . . or write us on your company letterhead . . . for complete technical data on the physical properties and recommended procedures for the successful use of Araldite Resins for your own fabricating needs.



Ciba

*Araldite is Trade Mark of Ciba Company Inc.

CIBA COMPANY INC., Plastics Division (M.P.)
627 Greenwich Street, New York 14, N. Y.

Please send me without obligation the new Ciba Araldite Resins Technical Bulletin
We are particularly interested in data on Araldite Resins applications for
Bonding ☐ Casting ☐ Coating ☐

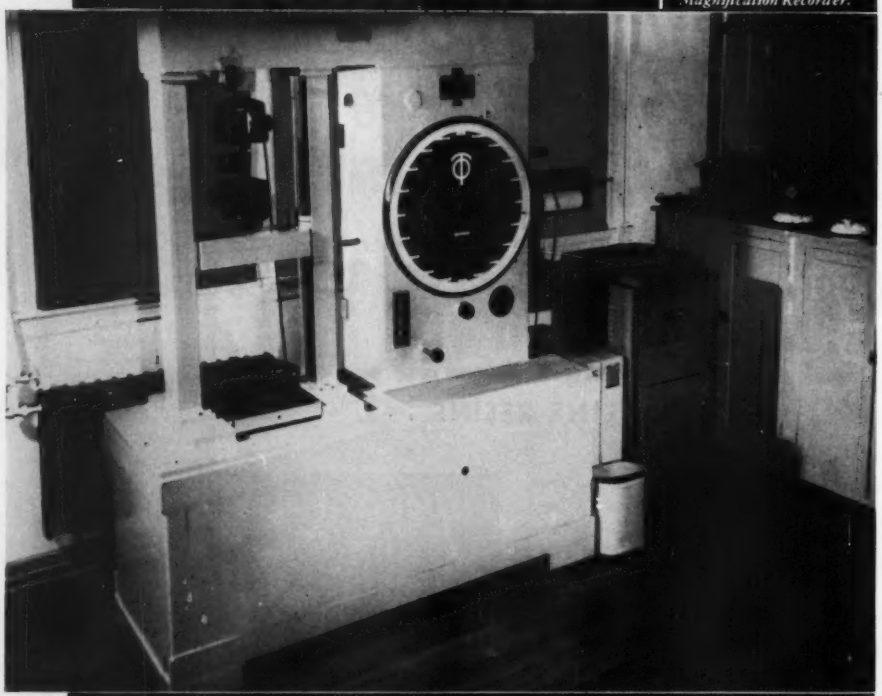
Name.....

Company.....Title.....

Address.....

★ FOR RESEARCH
★ FOR QUALITY CONTROL
★ FOR PRODUCTION TESTING

Research tension testing. Producing stress-strain curves with Olsen Plastiversal equipped with Olsen Electronic High Magnification Recorder.



it's the

OLSEN PLASTIVERSAL

THE UNIVERSAL TESTING MACHINE FOR PLASTICS

Courtesy of National Vulcanized Fibre Co., Wilmington, Delaware

WITH the Olsen Plastiversal you are assured of dependable, economical and accurate testing of all types of plastic materials, whether these tests are run on film, sheet, plates or blocks, molded specimens or other parts. It is easy to plot stress-strain curves when the Plastiversal is equipped with the Olsen High Magnification Recorder.

The Plastiversal by its very simplicity of design—operating parts are at a minimum—will keep maintenance costs low while making test after test for comparison, standardization, control and development of plastic materials.

Write today for our NEW Bulletin #36 which includes, not alone the Plastiversal, but many other Olsen machines designed specifically for plastics.

TINIUS OLSEN
Testing & Balancing Machines

TINIUS OLSEN
TESTING MACHINE CO.
2030 Easton Rd., Willow Grove, Pa.

FOR FORMING

or

LAMINATING

Dowtherm

means accurate control in process heating

Because DOWTHERM® heating means precision control, constant temperatures and uniform heat application, it makes possible new processes and new products.

In the plastics industry, DOWTHERM, used in molding plastic and rubber products, has improved product quality and reduced operating costs. Many production methods otherwise impossible can be utilized with DOWTHERM heating.

DOWTHERM speeds the heating cycle and at the same time reduces labor costs. Its outstanding characteristic is the accurate control it affords in obtaining temperatures between 300 and 750° F. at low pressures.

Are you fully acquainted with DOWTHERM's higher operating efficiency? We welcome the opportunity to discuss any process heat problems you may be confronted with. Write to Dept. DO 6.

THE DOW CHEMICAL COMPANY • MIDLAND, MICHIGAN

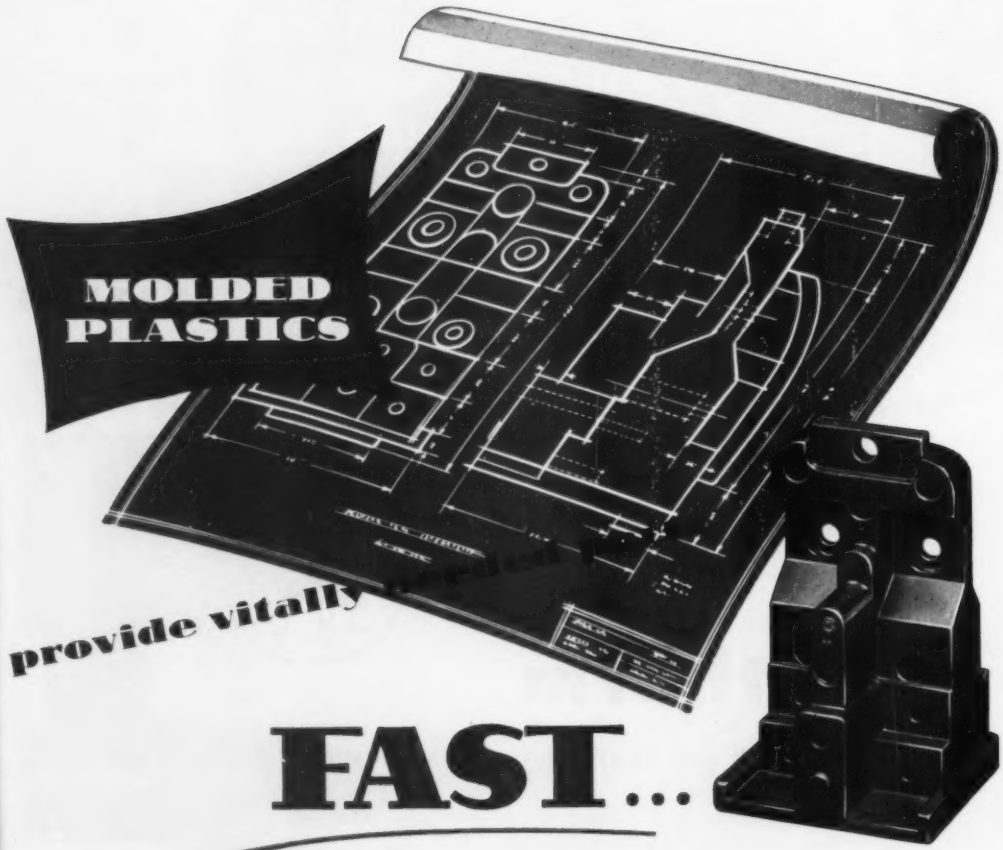
SPEEDS HEATING · IMPROVES PRODUCTION

DOWTHERM

DOW

CHEMICALS

INDISPENSABLE TO INDUSTRY AND AGRICULTURE



provide vitally

FAST...

From blueprint to finished part without time-wasting, cost-building delays! That's one important advantage of *modern* molded plastics. And it's the record of countless precision industrial parts produced by General Industries.

With today's high production schedules demanding "on time" delivery of component parts, there can be no guesswork about quality of materials or integrity of the supplier. At General Industries' large integrated plant, you'll find the top engineers, extensive facilities and unparalled experience which have made GI the trademark of highest quality molded plastics for more than a quarter-century.

General Industries is ready NOW to help you with *any* problem involving the application of molded plastics in your civilian or military products. No cost or obligation. Write today for a copy of General Industries' 16-page booklet, "Your Product in Plastic."

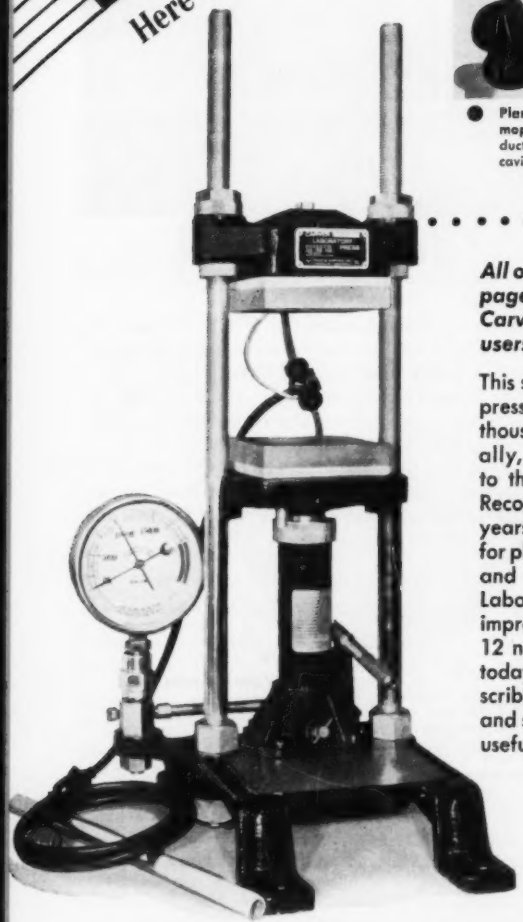
THE GENERAL INDUSTRIES CO. **DEPARTMENT R · ELYRIA, OHIO**

The Latest Edition of THE CARVER LABORATORY PRESS

Here Are A Few Results of Research & Development Done on the CLP

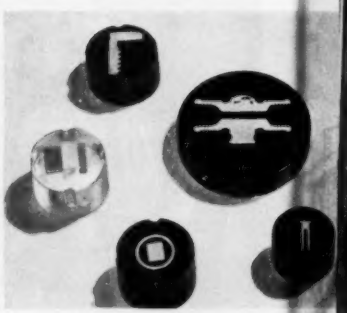
● **Plastic Molding of Thermosetting and Thermoplastic Materials**—Molding samples, production and color control work, testing single cavity molds, etc.

● **Rubber Molding, Vulcanizing, etc.**

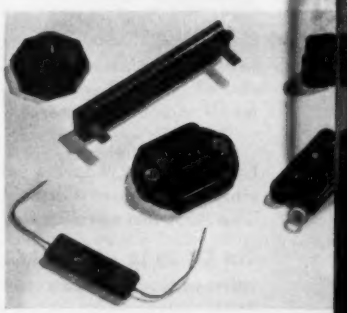


All of the items shown on this page were produced on the Carver Laboratory Press by users in the Plastics Industry.

This small, compact laboratory press is called "the press of a thousand and one uses." Actually, no one knows the limit to the number of its services. Recognized for more than 20 years as standard equipment for plastics laboratory research and development, the Carver Laboratory Press is now further improved by the addition of 12 new features. Mail coupon today for Carver Catalog describing these improvements and showing some of the many useful applications.



● **Mounting Metallographic Specimens**



● **Molded Pieces with Metal Inserts**

The Carver Press provides complete range of temperatures from room temperature to 400°F. Adjustable by thermoswitch to within plus or minus 2°F. Equipped with accurate 6" gauge, providing load readings up to 20,000 lbs. Low pressure gauges optional. Carver Standard Accessories include Electric or Steam Hot Plates; Electrically Heated and Water Cooled Hot Plates; Carver Test Cylinders; Swivel Bearing Plates; Cage Equipment, etc.

FRED S. CARVER INC.
HYDRAULIC EQUIPMENT
343 HUDSON ST. NEW YORK 14, N. Y.

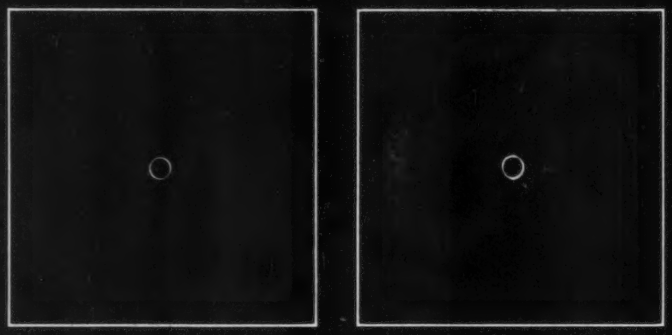
Please send latest Catalog, with full information about the Carver Laboratory Press, and Carver Standard Accessories.

NAME .....

FIRM .....

ADDRESS .....

This photograph tells a convincing story of RESISTANCE to ABRASION



1. 2.

COLUMBIA CR39*

The above unretouched photograph tells a story well worth remembering. CR 39 sheet (Fig. 1) and a common thermoplastic (Fig. 2) were put to the American Standards Association abrasion resistance test, No. 17.

Both materials were subjected to the Taber Abrader and abraded by CS10F wheels for 100 revolutions, then measured with an integrating sphere photometer.

The results were as follows:

Columbia CR 39 gave a value of about 3% haze while the common thermoplastic showed about 14%! The ASA test specification maximum is 15% haze.

Put CR 39 to your test : : : you'll find it proves outstandingly resistant to marring and abrasion

* * *

CR 39 is extraordinarily resistant to chemicals and solvents, does not craze when held under stress, and is resistant to distortion and flow under heat. Service tests of several years' duration prove these characteristics under practical conditions.

The outstanding characteristics of CR 39 make this material highly advantageous for use in radio and aircraft instrument panels, safety goggles, cover plates in welders' helmets, industrial crane enclosures, watch crystals, rear lights for automobile convertible tops, and numerous other commercial and military applications.

Samples and further information on CR 39 will be furnished on request. Write Pittsburgh Plate Glass Company, Columbia Chemical Division, Fifth at Bellefield, Pittsburgh 13, Pennsylvania.

*
CR 39, as furnished by Columbia, is a clear, colorless, water insoluble organic liquid of low viscosity.

CR 39 is available in transparent cast sheets of various standard or custom sizes, or in finished objects, from:

HOMALITE CORPORATION
11-13 Brookside Drive,
Wilmington 166, Delaware

CAST OPTICS CORPORATION
1 Post Road,
Riverside, Connecticut

OPTICAL PLASTICS CORPORATION
69 Southfield Street,
Stamford, Connecticut

COLUMBIA CHEMICALS

CHICAGO • MINNEAPOLIS • BOSTON
NEW YORK • CINCINNATI
ST. LOUIS • CHARLOTTE • PITTSBURGH
CLEVELAND • PHILADELPHIA

PAINT • GLASS • CHEMICALS • BRUSHES • PLASTICS

PITTSBURGH PLATE GLASS COMPANY

CUSTOMERS RE-ORDER with confidence from NORTON

Here's proof

1950

1932

Customer: Revere Copper and Brass, Inc.

1950

BACK IN the early thirties, Revere Copper and Brass, Inc. placed its first order for molded plastics with Norton. The plastic whistle and handle produced then proved so popular and satisfactory that plastic parts became permanent additions to the Revere line . . . and Norton has served Revere without interruption ever since.

The latest of the scores of plastic components Norton has made for Revere are the molded handle, trigger and whistle for their 1950 whistling teakettle and a plastic handle and knob for a skillet.

Such long association proves that Revere Copper and Brass knows the value of Norton's sound engineering, cooperative service, flawless molding, sensible pricing and dependable deliveries . . . And we hope you will soon learn their value, too.

It will be worth your while to get Norton's opinion on any future project involving the use of plastics. Ask for a free survey of your next molding assignment by an engineer from our nearest sales office. Write today. Norton Laboratories, Inc. Lockport, New York. Sales Offices: *New York —175 Fifth Avenue; Chicago—5221 Kimbark Avenue.*

NORTON *Laboratories, Inc.*

COMPRESSION AND INJECTION MOLDING

CHARGE

. . . but with what ?

There is, of course, no more critical question. For on the character of the charge depends the character of the finished product—and many vital considerations such as production costs, mold life, percentage of rejects . . . the very factors which determine whether you produce at a profit or not.

Therefore you cannot over-emphasize the importance of obtaining the most suitable, and economical, molding compounds for the jobs you handle.

That's where Metasap* Stearates can be of particular assistance. The Calcium, Zinc and other Stearates which we manufacture for use in molding plastics have proved conclusively that they promote significant manufacturing economies *all along the line* . . . and assure better products, too.

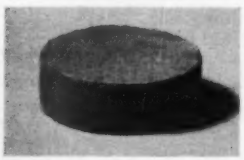
Yes, there is no question that lubricating with Metasap Stearates assures—

IMPROVED PREFORMS

IMPROVED FINISHED PRODUCTS

INCREASED OUTPUT at LESS COST

This picture shows a preform typical of a great number test-molded from compounds that did NOT contain a Metasap Stearate as lubricant. Such preforms required an average of 50 pounds pressure to eject them from the mold, and a large percentage were delaminated in the process.



And here's a picture that shows a typical preform obtained, during the same tests, from molding compounds containing Metasap Calcium Stearate. Perfect in shape, such preforms required only 10 pounds of pressure to release them from the mold.

Today, when in the face of shortages you must make every ounce of molding compound count, you'll find no more effective aid to profitable compression molding than Metasap stearate lubrication.

*REG. U.S. PAT. OFF.

METASAP CHEMICAL COMPANY *REG. U.S. PAT. OFF.

For complete information, write

METASAP CHEMICAL COMPANY, HARRISON, N. J.

Chicago • Boston • Richmond, Calif. • Cedartown, Ga.

Stearates

of Calcium • Aluminum • Lead • Magnesium • Zinc

The *Convair* RB-36 Reconnaissance Bomber is equipped with ZENALOY* parts by ZENITH

The jet-augmented Convair RB-36, equipped with the most powerful cameras ever installed in an airplane, is designed to serve as airborne eyes and ears for the Strategic Air Command. It operates in the stratosphere, can speed more than 435 miles per hour, and its mission is to seek out and bring back the facts on enemy targets, no matter how well hidden, guarded or isolated.

The delicate and complex electronic equipment designed to aid in this vital task is housed in and protected by ZENALOY* radomes produced by ZENITH.

For any part or product contributing to the defense program that can be manufactured in reinforced plastics, communicate with the ZENITH Engineering Division today.

ZENITH PLASTICS CO., Gardena, California

OTHER AIRCRAFT EQUIPPED BY ZENITH
Aeronca • Bell • Boeing • Cessna • Chance-Vought
Curtiss-Wright • Douglas • Fairchild • Lockheed
Martin • McDonnell • Republic

R.P.* Reinforced Fiberglas Plastics

The experience of our laboratories in the development of Vinyl Plastisols have been widely recognized in the plastics molding industry. Our "know how" has solved many specific problems of application and production.

A request to the Watson-Standard technical staff will provide you with assistance in meeting your particular specifications and production methods. There is no obligation. Write today.

Send for your copy of technical paper entitled "Slush Moldings." It's free!

WATSON-STANDARD CO.
225 Galveston Ave. Pittsburgh 30, Pa.
NEW YORK OFFICE 15 Park Row New York 17, N. Y.
CHICAGO OFFICE 55 E. Washington St. Chicago 2, Ill.

TINNERMAN

Speed Nut

SAVINGS STORIES

ROUGH

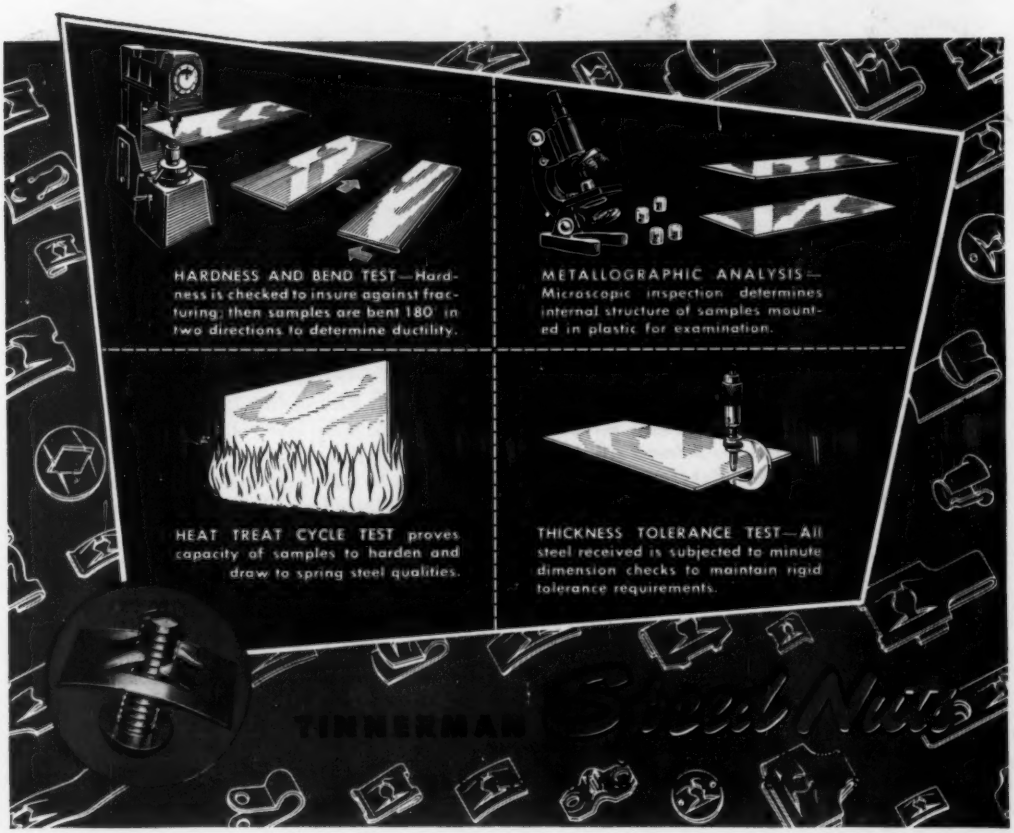
ON RAW MATERIALS

Quality of materials has a lot to do with the quality of fasteners produced for your products. That's why every coil of spring steel, every shipment of finishing paints and chemicals and every material required for the manufacture of SPEED NUTS is subjected to rigid "entrance exams."

The primary raw material, steel, gets the most intensive checkout. Four laboratory procedures must be conducted on samples from every steel lot. Bend Test; Metallographic Analysis; Heat-Treat Cycle Test; and Thickness Tolerance Test.

Raw materials testing is Stage One in Tinnerman's program to guarantee you highest quality SPEED NUT brand fasteners for all types of attachments. Follow your fasteners through all stages of Tinnerman quality control . . . write for your copy of "Story of Quality", new 20-page booklet.

TINNERMAN PRODUCTS, INC., Box 6688, Dept. 12, Cleveland 1, Ohio. In Canada: Dominion Fasteners Ltd., Hamilton. In Great Britain: Simmonds Aerocessories, Ltd., Treforest, Wales.


HARDNESS AND BEND TEST—Hardness is checked to insure against fracturing; then samples are bent 180° in two directions to determine ductility.
METALLOGRAPHIC ANALYSIS—Microscopic inspection determines internal structure of samples mounted in plastic for examination.
HEAT TREAT CYCLE TEST proves capacity of samples to harden and draw to spring steel qualities.
THICKNESS TOLERANCE TEST—All steel received is subjected to minute dimension checks to maintain rigid tolerance requirements.

where durability counts...

Be Sure to Specify Emery Plastolein 9720 Resinous Plasticizer

Whatever you make . . . be it plastic overshoes for dainty feminine feet or a tough, scuff-resistant trim for luggage—if it must be durable, then get Plastolein 9720 Resinous Plasticizer. A polyester type compound, this unusually stable plasticizer was compounded specifically to provide *durability* in heavy-gauge vinyl sheeting. It makes possible plastic products with remarkable resistance to water extraction. In addition, Plastolein 9720 is characterized by extremely low volatility, superior heat and light stability and excellent resistance to oil extraction. Also Emery Resinous Plasticizers are easier to handle, more readily pumped and shipped in bulk—because of their lower-than-usual viscosity.

Be certain your plastics remain plastic! **Specify** { EMERY PLASTOLEIN PLASTICIZERS *every time!*

Emery *Plastolein Plasticizers*

EMERY INDUSTRIES INC.

Carew Tower Cincinnati 2. Ohio

Branch Offices:
3002 Woolworth Building, New York 7, N. Y.
187 Perry St., Lowell, Mass.
401 N. Broad St., Philadelphia 8, Pa
420 Market St., San Francisco 11, California
Export: 5035 R. C. A. Building, New York 20, New York

A SPECIAL SERVICE TO MODERN PLASTICS READERS, REPORTING AND INTERPRETING THE LATEST NEWS AND DEVELOPMENTS FROM WASHINGTON AND ELSEWHERE AS THEY AFFECT THE PLASTICS INDUSTRY AND THE MOBILIZATION PROGRAM

Modern Plastics BULLETIN

March 15, 1951

The Benzol Riddle

The plastics industry is in a dither over a record benzol production in the last quarter of 1950, which included an operating rate in December that would assure almost 240 million gal. in 1951 if that rate could be sustained. Despite this record, benzol users who produce plastics insist that benzol is just as tight or tighter than ever. Most common explanation of the 20 million-gal. December production figure listed in the Tariff Commission report is that it must have included some of the 5 million gal. imported in November and which some refiner reported as new production. Then, too, the extreme tightness of benzol in March may have resulted from drastically curtailed production in February during the rail strike; there are no figures as yet to sustain this theory.

Total production of "other than motor benzol" for 1950 was almost 190 million gal. in comparison to less than 125 million gal. in 1949. In addition, over 20 million gal. was imported in 1950, but much of this was low grade which converts to about 700,000 gal. of refined from 1,000,000 gal. of unrefined.

An added explanation of the big production was that increased steel production and installation of new coke ovens may have contributed more than expected. More than 520 new coke ovens were installed in 1950. About 50% replaced old ovens and thus increased efficiency. In addition, more than 800 new ovens will be built in 1951.

Goal is 400 million gallons

NPA says that the country will need over 250 million gal. of benzol to meet the needs scheduled for 1951. If domestic production rate as reported for the last quarter of 1950 is correct, and the expected 50 million gal. is imported, the picture is rosy. But if anyone tries to paint a rosy picture about benzol today, he is looked upon as pretty dumb by Washington officials and benzol users. The long range picture is encouraging, but the immediate situation is horrible, they say.

The goal for benzol production by 1955 is between 300 and 400 million gallons. The additions above the already mentioned capacity are expected to come largely from petroleum companies. Three already are reported to be making plans to add some 40 million gal. to present capacity, but not until 1952. It is possible that by late 1952, the operating rate for benzol will be 300 million gallons.

This new benzol will be needed for 100 million more lb. of phenol capacity (part for 1951; part for 1952); some 25 million gal. for a proposed 200 million-lb. increase in styrene monomer capacity; 5 to 7 million gal. for aniline increases; and some 60 million gal. for miscellaneous items such as detergents, insecticides, etc. Perhaps another million gallons will be needed to produce aspirin to help get rid of benzol-created headaches that have been built up in the interim!

Styrene Monomer Production

There may be some question as to where the benzol came from in late 1950, but there isn't much question as to where it went. Production of every product using benzol went way up. Phenol went to 29 million lb. in December, the biggest month on record except last October which was about the same. There is evidence to support the claim that some of the smaller phenolic producers got a bigger-than-usual haul from this total. Yet phenolic compounds are just as tight in March as they were last fall; there is as yet no indication of the expected slump in demand due to cutbacks of durable goods that use phenolic parts.

But styrene monomer was an even bigger surprise with a 56 million-lb. production in December—a rate of 670 million lb. a year—which few people believed possible when that potential capacity was printed in an S.P.I. release last fall.

The styrene used for rubber amounted to approximately 18.5 million lb. in November; 20 million lb. in December; 24.5 million lb. in January. It will go to about 30 million lb. in April or May. About 170 million lb. were used for rubber in all 1950 out of the total styrene production of 540 million pounds. The amount left after rubber was provided for went into

258 million lb. of polystyrene in addition to other products such as shoe soles, paint, etc., and into supply lines on the way to 1951 production.

If the 56 million-lb. styrene monomer monthly rate can be maintained, there would be over 30 million lb. available for plastics monthly, but molders are cautioned that nowhere near all of this would be available for polystyrene. Most suppliers don't believe that the 56 million-lb. figure can be maintained because it is impossible to operate steadily at maximum capacity, especially when there is no chance to store up an inventory of feed stock. They point to February in particular when the rail strike slowed up deliveries with the result that polystyrene production is estimated to have dropped under 15 million lb. in comparison to over 20 million lb. produced in December and January.

Control Order for Chemicals and Plastics

Issuance of a new control order for chemicals similar to the old M-300 of war-time days has been a foregone conclusion ever since last November.

It is presumed that the first materials to be affected will be sulfur, benzol, and perhaps chlorine. Some of the plastics that may soon follow are ethyl cellulose, nylon, polyethylene, vinyl acetate, and Teflon. For the time being, most large volume plastics will probably continue under DO orders, but as defense business expands, DO orders become less and less efficient.

When DO orders become useless

The weakness inherent in DO orders is that they spread out and out and thus become virtually useless. Efforts at control by limiting the amount of material which a supplier is required to furnish for DO orders fail when an ever mounting defense demand requires the government to increase that same percentage every month. Furthermore, the DO extends into and upsets other branches of industry when it is used to obtain feed stock, containers, etc. If allowed to go far enough, there would soon be necessary a whole flock of priorities on top of priorities. There would be DOX, DOXX, DOXXX, ad infinitum, as each material becomes more difficult to obtain for defense jobs; then the issuance of a priority with anything but the very highest rating would be reduced to a mere scrap of paper.

An attempt has been made by the government to further adjust the defense economy by issuing limitation orders and directives banning use of certain materials or permitting use of only a certain percentage of those materials in so-called unessential end products. For example, aluminum suppliers might be required to channel 35% of their output into DO orders, but forbidden to permit use of any of what remains for such things as window frames, awnings, and roofing. The administration and control of such regulations that hit both ends of a supply line is a disrupting and confusing influence to both government and industry executives.

The purpose of the new chemical order will be to consolidate priority and allocation operations so that they may be handled by both government and industry in the most efficient manner possible. Government officials believe that experience gained in the last war proves that this proposed method is far more satisfactory than the DO system.

How the order will work

The order itself does not place any chemical or plastic under immediate allocation, but sets up the machinery for that purpose so that materials may be quickly allocated when the need arises. There are three different methods under which a given material may be allocated by this machinery, any one of which may be specified for a plastic material when it is placed under allocation. They are as follows:

Appendix A. Authorization to a molder, laminator, etc., to receive a given amount of plastics for a named end use. Another authorization to the supplier permitting him to ship plastics to the above-named consumer.

Appendix B. Authorization to a supplier to ship plastics to a customer who has certified that he will use it for a specific end use. The supplier simply lists all his purchase orders with the certified end use for each order. In this case there is no contact between the consumer and the government, but the consumer will be held responsible if the plastic material he receives is used for any other purpose than that specified on his certified order. This was the type of allocation most frequently used for plastics during the latter stages of World War II.

Appendix C. A combination of both the above systems. Under this schedule, system B would be used for small and medium sized orders. System A would be used for extremely large orders of over a specified quantity. This schedule is more appropriate for such large volume chemicals as sulfuric acid and chlorine than it is for plastics.

Plastics material for non-essentials

It can be seen from the above that the new order will eliminate the DO business for chemicals and plastics that are placed under government allocation, because military requirements will be taken care of automatically by the NPA allocation officers before material is allocated for other purposes. The most important essential civilian production will then be supplied. What comes after that is still a matter of doubt. Present thinking in the government seems to be that after military and essential civilian items are allowed, the remaining plastics materials should be turned back to the supplier to distribute as he sees fit. It is also believed that this type of distribution would be more helpful to small business, since a man

making several different products of low essentiality might at least get enough material to keep one of them in production.

Will Polystyrene Be Allocated?

Since very little straight polystyrene is going into defense items, there would seem to be little excuse for placing it on allocation. The small amounts so far needed for defense could easily be handled in DO orders and would cause scarcely a ripple in the industry.

But when the supply of a big volume material like polystyrene is running so far behind demand, there may eventually come a time when some molders who think they are working on more essential civilian products than others will ask for a preferred delivery position. If they go to NPA with this request, what will be the answer?

Producers may handle allocation

Government officials currently seem to feel that the producers are themselves competent to determine how the non-defense polystyrene should be divided among their customers; that in their desire to build for the future of the industry the producers will divide their material most equitably and with fairness to all.

If the government is forced to intervene, it will have to pass judgment on the relative importance of such things as combs, kitchen equipment, refrigerator parts, wall tile, brush bristles, toys, and a host of other things. The prevailing opinion today is that the industry would prefer to do its own allocating. No government man wants the responsibility for determining whether a kitchen funnel is more important than a knitting needle. The molder of various products could thus use his allocation for whichever item he deemed most advisable.

Perhaps a more important angle is the possible allocation of styrene monomer. This could well raise hob with polystyrene production, since it is certainly no well-established fact that all monomer remaining after rubber gets its haul will go to straight polystyrene. For example, the styrene copolymers with higher impact resistance are being eyed with no little interest by the military. Limited production is presently a hold-back, but if several items now under study prove satisfactory, there could be such a large demand that increased facilities for producing the copolymers might well come into existence. One company at least has already announced that greatly expanded facilities for its copolymer will come into production this fall.

Styrene for shoe soles

Another large potential use of monomer is in the styrene-butadiene compound used in shoe soles. This application has potential high essentiality because of the scarcity of leather. Military tests are now under way to determine the fitness of the compound for soldiers' shoes. It has succeeded so well in civilian life that stories have been told that the material has even been degraded in some instances because customers complained that soles outwore the leather uppers.

Then there is styrene needed for ion exchange resins used in water purification, which in many cases will bear a high priority. Water paint producers will also put in their bid for styrene to use in the styrene-butadiene latices which are the base of their newly developed paint for which new sales records are being established. Brush bristles also rate highly because of the shortage of broom corn and other bristle materials.

Polyesters will get styrene

The polyester resins will most certainly command a portion of the styrene monomer available, for these —above nearly all other plastics—are the darlings of the military who never cease to talk of the things they hope to get in polyester-glass products. Potentialities are fantastic if even a few of the proposed applications get into full-scale production, but for the year 1951 at least it is not likely that more than 10 million lb. of styrene will be needed for this purpose. There is every likelihood that what is needed for military polyesters in 1951 will be available. Even the civilian polyester items rate high, since they are so frequently used to supersede other materials, many of which are also tight.

There is no telling when either monomer or polymer may go under allocation, but the battle for preferential rating of the products made from them is going to be no small potatoes.

Cellulosics

There is slight hope that cellulose acetate and cellulose acetate butyrate molding material production will average more than 7 million lb. a month in 1951. In the fall months of 1950 the rate was around 8 million pounds. The shortage of cellulose, cotton linters, acetic acid, and plasticizers is largely responsible for the failure to meet demand. Acetate flake is also in high demand by the rayon industry, and plastics must compete with that product for its supply. And there is the distinct possibility of new military applications that may take as much as 1 million lb. a month of molding material.

The new Celanese plant in Canada will start production soon, but the demand is so great that little help to the plastics program is anticipated. Furthermore, Celanese is reported to be diverting more acetate to film and sheet products which are being demanded in increasing volume by the military. Celanese reports that molding material will continue to be available but at a drastically reduced rate compared to last fall. All producers claim that the situation is tighter than at any time during the last war and that contractors

who have promised delivery of feed stocks are unable to meet their commitments, a condition that seldom existed in the 1942-45 period.

The plasticizer shortage for acetate is due to a lack of diethyl and dimethyl phthalate. One producer of flake is recommending that his customers use one of the following plasticizers as extenders when they can get them: Atlas' new Pycal 29 (which is in only small supply and is dependent on phenol); ortho-nitrile-biphenyl; triethylene glycol diacetate; ortho-sec-amyl-phenol. Triacetin was used to some extent during World War II, but produces a water sensitive product. Triphenyl phosphate is suggested for sheet stock.

Ethyl cellulose on allocation?

It is believed that ethyl cellulose will soon go on complete allocation. The amount needed for DO orders already exceeds the 40% set aside under NPA Order M-32. One producer reports that DO orders are requiring his complete production. There are facilities to produce a little more, but there is not enough ethyl chloride available. Production capacity is close to 1 million lb. a month. The largest DO order continues to be extruded inhibitor strips for rockets. There is as yet little evidence of large procurement for proximity fuses. Large orders for military flashlight cases have been placed within the month.

Thermosetting Molders at Washington

A recent meeting in Washington, D.C., sponsored by S.P.I. to call attention of the government's plastics technicians to thermosetting plastics products, was highlighted by a 10-table exhibit of thermosetting products molded during the 1941-45 war years. Talks by Allan Fritzsche and James B. Neal called attention to improvements in technique and equipment since World War II.

The experience of the thermosetting industry in the last war could not be better illustrated than by noting that value of thermosetting products increased from $69,510,000 in 1941 to $101,687,000 in 1944, and nearly everything molded in those days was either a war goods item or of high civilian essentiality. Today the industry is at the beginning of a sizable changeover from civilian to military goods and there is a wide variety of current opinion as to how much conversion is under way and how long it will take to really get going on military orders.

Most molders insist that less than 5% of their present production is on a DO basis. The other extreme is a molder who claims 95% DO business. The most prevalent belief is about 15% DO business or 5% less than was estimated in this column last month.

Inquiry among molders at this meeting indicated that almost none of the items shown are now on procurement except a few pieces used primarily for airplanes. There is certainly no guarantee that any considerable percentage of these same items will ever be procured again; a procurement officer in the Ordnance Dept. has said that practically every plastics item on his list is new since 1947. This situation, of course, means that molders will have to dig deep for potential orders.

Another observation made at this meeting was that few of the government's plastics technologists who attended paid much attention to the thermoset displays. When queried about what seemed like a lack of interest, they answered about as follows:

"Most of us went through the last war and have seen or even helped develop these applications. We believe that we are familiar with most of the things that can be done with phenolics, melamine, and urea. We are not procurement men—we are essentially researchers and constantly on the hunt for *new* materials and *new* methods for handling all materials.

"It is practically useless for a salesman to talk to us unless he is technically trained and can tell us exactly what his firm can do in a technical way. We have even had business representatives come to us who didn't know whether their firm was a compression or injection molder. Furthermore, those of us in technical development do not handle procurement; our job is to find out whether or not plastics can be used for certain applications. If we find that it can, the procurement job then goes to various purchasing agents in the government or to prime contractors who will get their plastics parts from subcontractors."

Hints on procurement

A few hints on procurement were then offered along the following lines:

There are literally hundreds of procurement officers; they must be sought out just as they are sought out in civilian business.

Obtain a copy of the Military Index from the Government Printing Office, Washington, D.C. It lists products, specifications, and names of the custodian of each spec. But study it carefully—there are many items containing plastics which are listed as something else. Thus, belts for jackets may have a plastic buckle. Don't expect ever to find a list of plastic products wanted in Washington any more than you would expect to find an itemized list of plastic products used in automobiles in Detroit.

Concentrate on prime contractors—they will be ordering most of the plastics parts wanted from now on. Take the missile program, for example: practically every aviation company and most electrical companies, including television, electrical instrument companies, etc., have obtained prime contracts in this program. Watch the daily papers which contain announcements of new contracts almost every day, most of them on such a scale as to indicate that subcontracting will be necessary to get the job done.

MODERN PLASTICS
VOLUME 28 APRIL 1951 NUMBER 8

Plastics in Aircraft

A PROGRESS REPORT

Courtesy USAF Air Material Command

Like most modern military planes, the North American B-45 bomber has radome and antenna covers made of glass cloth and polyester resin, and canopy made of acrylic. The "chin" radome built into the fuselage is one of the largest radomes being made

ACRYLIC for canopies and windows, and polyester-Fiberglas materials for radomes are still the major applications of plastics in aircraft. But there have been significant changes since the end of World War II in the plastics materials themselves, in the manner in which they are processed, and in the manner in which they are used in aircraft.

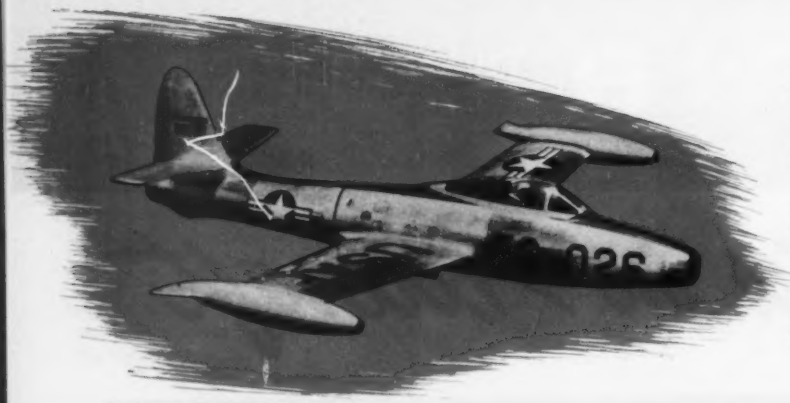
Canopies and Windows

Materials—One of the most significant changes as far as canopies and windows are concerned has been the widespread use of heat-resistant acrylic instead of the standard acrylic used at the end of the war. Although helicopters and many low-speed conventional aircraft still use standard acrylic, virtually all high speed planes with formed canopies use Plexiglas II.

The high heat-resistant material has been adopted partially because of the higher heat resistance required in high speed aircraft and partially because the material has better craze resistance than standard grade acrylic.

Another improvement in acrylic has been the use of a laminated material built on the same principle as safety glass. This three-ply material consists of two layers of 0.150-in. thick acrylic with a 0.20-in. thick layer of highly plasticized polyvinyl butyral between them. The soft inner layer prevents the collapse of the entire structure when it is penetrated by a bullet. Cracks around a bullet hole, which often spread in acrylic, do not spread in the butyral. Shatter-proofing is of course particularly important in planes with pressurized cabins.

Goodyear Aircraft Corp., Akron, Ohio, and Swedlow Plastics Co.,



Courtesy Republic Aviation Corp.

Acrylic canopy of Republic F-84E is formed with centrifugal force rather than air pressure. Tip of tail fin is made of glass cloth and polyester

Los Angeles, Calif., produce most of the acrylic canopies not made by the aircraft manufacturers themselves.

Another development in materials since World War II was the introduction of a transparent thermosetting plastic sheet material known as Sierracin. This material, a special polyester formulation, is made by Sierra Products Co., Compton, Calif. It is guaranteed by the manufacturer not to craze and can be cleaned with any standard cleaner or with alcohol, methyl ethyl ketone, or lacquer thinner.

Sierracin is being used for windows on the Lockheed Constellation models 749 and 049, the Martin 404, and the Douglas DC-3, DC-4, and C-54. It has also been used for a large curved light lens on the Lockheed Constitution. The lens was cast to shape.

Sierracin is available in sheets up to 60 by 90 in. and in thicknesses up to $\frac{5}{8}$ in. with tolerances of ± 0.007 in. in thickness. The manufacturer states that newly developed formulations of the material can be formed into any curves likely to be encountered in aircraft canopies. The forming is done at approximately 250° F. against rubber without mark-off. A shatterproof polyester material with a polyvinyl butyral interlayer for use in pressurized planes is also under development.

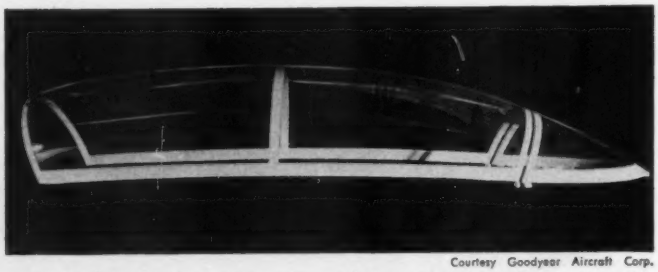
In addition to heat-resistant acrylic, laminated acrylic, and Sierracin, two other plastic materials give promise of becoming important in the canopy and window field. One of these is CR-39, allyl diglycol carbonate, which has already been approved by Wright Field as an acceptable alternate material for use on Air Force planes wherever acrylic is now used. CR-39 has not yet been used on any production aircraft, mainly because of the difficulties of forming and fabricating it.

Another material which is believed to have great promise is polymethylalphachloroacrylate. This material is a high temperature thermoplastic developed in the Easton, Pa., research laboratory of General Aniline & Film Corp. A similar material is under development at Arnold-Hoffman Co., Inc., Providence, R.I., a subsidiary of Imperial Chemical Industries, Ltd., London; some work has also been done on it in England.

Chloroacrylate has a heat distortion point of 266° F. (as against 176° for standard acrylic and 212° for heat-resistant acrylic) and can be formed at about 320° F. It is nonflammable and has much better resistance to crazing than acrylic. The material is more expensive than acrylic, but cost is not a major factor in military aircraft. Its non-flammability and resistance to crazing may justify the higher cost of chloroacrylate for skylights and other architectural applications for which it is being considered in England.

Forming methods—In addition to changes in the materials used for canopies, forming methods and techniques have also progressed. The availability of larger acrylic sheets and the perfection of forming techniques has made it possible to produce larger canopies.

The largest canopy made during the war was about 60 in. long. The largest now made in a single piece, the canopy for the Lockheed F-94, is about 90 in. long.



Courtesy Goodyear Aircraft Corp.

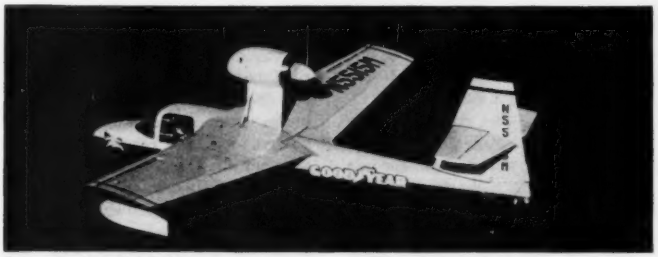
Rotoformed canopy for bomber has acrylic-impregnated glass cloth strips bonded to its edges. Attachment bolts go through edge strips instead of through the acrylic itself

Not only have forming techniques been improved, but one completely new technique, developed at the end of the war, has come into wide use. This technique, developed and patented by Goodyear Aircraft Corp., is known as Rotoforming. The difference between blowing and Rotoforming is that in the latter centrifugal force is used instead of air pressure. The heated flat sheet is mounted on the end of a rotating arm and then whirled around at a predetermined speed. According to Goodyear, this technique makes it possible to produce curved shapes with cross sections other than circular, without mark-off. It is also claimed that Rotoformed canopies have better optical properties than mold-formed canopies.

The first Rotoformed canopy was made for the Republic F-84. It did not go into production until after V-E day, and the aircraft was not flown until after the end of the war. Now the Republic F-84E, the Chance Vought F4U-5, and many other

planes have Rotoformed canopies.

Mounting methods—Along with the improvements in plastic canopies themselves, there have been improvements in the methods of attaching acrylic canopies to the aircraft fuselage. Instead of bolting the acrylic to the fuselage or to metal frames, more and more aircraft manufacturers are making use of acrylic-impregnated glass-cloth edge attachments. These are bonded to the canopy, and the bolts are put through the edge attachment rather than through the acrylic itself. This puts less strain on the acrylic canopy, and there is less likelihood of cracking. Another variation of this method makes use of an acrylic-impregnated wire mesh which is bonded to the canopy.



Courtesy Goodyear Aircraft Corp.

Goodyear GA-22 amphibian has nose bumper, wing tips, fin tips, rudder and stabilizer tips, and window frames made of glass cloth and polyester resin void-free laminates

Radomes

Like canopies, plastic radomes have changed considerably since the end of World War II. On the whole, they are larger, more uniform, and stronger. And in modern planes they are often designed to fit flush with the fuselage as an integral part of the plane instead of as a bulbous appendage. From that point it was but a small and obvious step to the use of plastic laminates for other structural parts where no electronic considerations were involved.

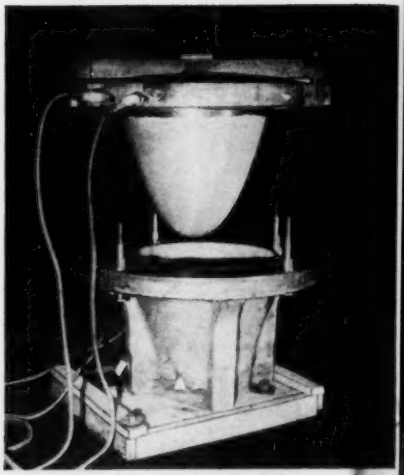
Perhaps the most important change in radomes made of Fiberglas cloth and polyester resin has been the improvement in quality which resulted from increased knowledge of manufacturing processes and their effect upon the properties of the finished piece. During World War II, the need for rapid production coupled with the belief that cheap wood and plaster molds were "just as good" resulted in the production of many parts which were literally slapped together. The parts served the purpose for which they were intended —but many of them were full of air pockets or voids and would be considered unsatisfactory by present standards.

According to Goodyear Aircraft Corp., which has studied laminates to determine the effects of voids on strength, high quality conventional laminates have only 54 to 79% of the strength of void-free laminates. The latter are also less porous, have less water absorption, and are more transparent. The void-free laminates are produced by using enough resin to flush out all air bubbles and curing the laminate at low temperature.

The most important development since the end of the war, aside from the improvement in the quality of the laminate, is the development of a satisfactory plastic material which can be foamed in place in sandwich constructions. The material, alkyd isocyanate, is used with polyester-Fiberglas laminates in special radomes where the electrical requirements are critical.

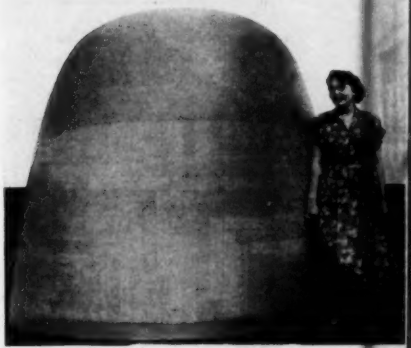
Goodyear Aircraft makes one such foam material. Another, Lockfoam, is made by Lockheed Aircraft Corp. The adhesives divisions of Armour & Co. produces a polyisocyanate foam material.

The advantage of a foamed-in-place material over other types of cores for sandwich constructions is that tapered or irregular sections can be produced without tailoring the core material to shape. To date, the isocyanate materials are the



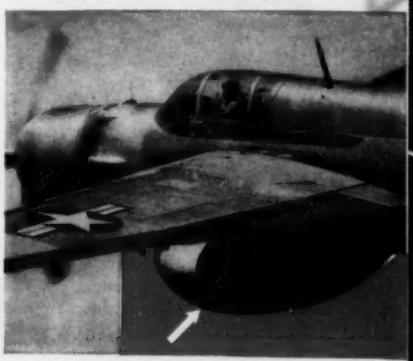
Courtesy Goodyear Aircraft Corp.

Radome with foamed-in-place alkyd isocyanate core is made in metal mold



Courtesy Zenith Plastics Co.

Large radome has neoprene coating on leading edge to retard rain erosion



Courtesy Grumman Aircraft Engineering Corp.

Grumman AF-2W Guardian has 12-ft. long honeycomb sandwich radome

Courtesy Rex Plastics Co.

Antenna mast made of polyester and glass cloth is 2 ft. high, weighs 3 lb.

Courtesy Republic Aviation Corp.

Junction box cover for Republic F-84E has wiring diagram molded-in. Cover is made of glass cloth and polyester

only ones which can be foamed in place and which also have sufficient physical strength and will bond to the skins of the sandwich.

Isocyanate foam is used in the core of a number of radomes in new fighter aircraft. It is also used as a core material in many larger radomes, up to and including a 66-in. diameter, 40-in. high radome made by Rex Plastics Co., Gardenville, N.Y., for a B-36.

Almost every modern military plane has at least one radome and also has a tail fin tip which is an antenna cover and is therefore made of Fiberglas cloth and polyester. Most of these parts are furnished to aircraft manufacturers by Goodyear Aircraft or by Zenith Plastics Co., Gardena, Calif. Among the radomes made by Zenith are those on the McDonnell Banshee, the Lockheed F-90, T-33, and P2V-4, and the Consolidated P5Y-1 flying boat.

One of the largest radomes being made is the one on the Grumman AF-2W Guardian. This under-fuselage radome is about 12 ft. long and 7 ft. wide and is molded in one piece by Goodyear Aircraft of a honeycomb sandwich material with Fiberglas cloth and polyester skins. Another large radome is the one which forms the "chin" of the North American B-45 jet bomber.

Rain erosion—The major problem so far as plastic radomes are concerned is one which has become more serious since World War II—the problem of rain erosion. When aircraft began to fly at speeds well above 300 miles per hour, those which flew through rain often returned with the leading edges of their radomes literally torn up by the abrasive action of the rain drops.

The problem of rain erosion is not peculiar to plastic materials. Aluminum, magnesium, and other materials are also affected. However, the problem is particularly serious insofar as plastics are concerned because a polyester-Fiberglas radome can be penetrated by a few minutes of exposure to rain at 400 miles an hour. The best solution found thus far is to coat the leading edges of radomes with neoprene.

The Cornell Aeronautical Laboratory, Buffalo, N.Y., is working on the problem of rain erosion and has found that a pure polyester test specimen (which has better resistance than any laminate) will last about 3 min. in rain at 500 miles per hour. A piece coated with neoprene will last 180 min. at 500 miles an hour—but even this is not considered satisfactory for all-weather fighter plane operation.

Other Structural Parts

Although radomes and antenna covers account for most of the opaque plastic parts used on the exterior of aircraft, there is a growing trend toward the use of Fiberglas cloth and polyester resin for parts where manufacturing considerations rather than electrical considerations dictate the use of plastic.

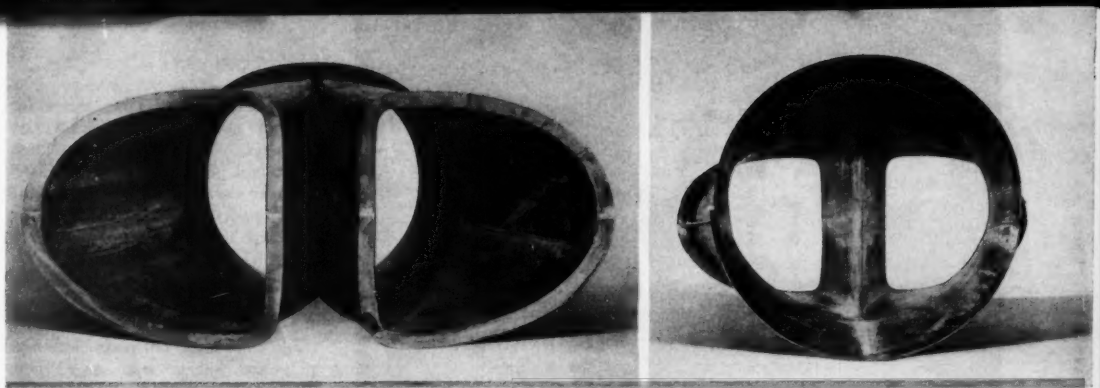
The use of polyester laminates and polyester laminate-skinned sandwich constructions for structural parts of wings and fuselages is more common in the construction of guided missiles than in piloted aircraft. However, all such projects are highly classified, and details of the type of plastics used and the parts for which they are used are not available for publication now.

The North American F-86 probably has more such parts than any other piloted craft. The wing tips (for about 8 in. in), the fairings at the wing root, an intake nose, part of the dorsal fin, and the rudder tips are all made of Fiberglas cloth and polyester. In most of these parts, the compound curves involved made the plastic more economical than any other material.

Isocyanate foam, although developed for use in radomes, is also being used in other structural applications. In the Grumman F9F, the control tabs and the trailing edges of the wings and elevators are strengthened with isocyanate foam instead of with ribs. The material, supplied by Armour, is foamed in place around a core of hard rubber foam. This construction, which extends for 12 to 18 in. from the trailing edge, cuts down the weight of the structure, simplifies construction by cutting down the number of parts, and results in an aerodynamically cleaner skin by eliminating the rivets needed when a ribbed construction is used. Lockheed is making similar use of Lockfoam in trim tabs.

Chance Vought Aircraft is also making use of Fiberglas and plastic for primary and secondary structural components, particularly those with compound curves. For example, Chance Vought is making fuselage and wing air intake ducts for jet engines. One such duct, which is completely enclosed, is molded on a breakable plaster mold. Another, which is made up of two halves riveted together, is made on a cast metal mold.

To make the ducts, Chance Vought spray-impregnates Fiberglas fabric with a liquid phenolic-type resin. The fabric is allowed to dry, then is cut to shape, laid up on the mold, enclosed in a blanket or



Photos courtesy Chance Vought Aircraft

Aircraft duct 22 in. in diameter is used in Chance Vought plane. The duct is made of glass cloth spray impregnated with liquid phenolic resin and is fabricated of two riveted halves. The parts are produced in a cast metal mold under a pressure of 70 p.s.i. for 1 hr. at 250° F.

diaphragm, and then cured in an autoclave under 70 p.s.i. pressure for 1 hr. at 250°F.

One impressive structural application in which some electrical considerations are involved is the use of polyester-impregnated Fiberglas cloth to make antenna masts for a number of Navy aircraft. The material is used to eliminate precipitation static which results from the static charge built up on aluminum masts by the abrasive action of rain or dust.

The plastic masts, made for the Navy by Rex Plastics Co., are 24 in. high, 3¼ in. wide, and 0.83 in. thick at the thickest point. Some of them are solid, and some have holes through the center to accomodate the antenna lead. The solid masts weigh 3 lb. each. Similar masts are made by Zenith and by Goodyear.

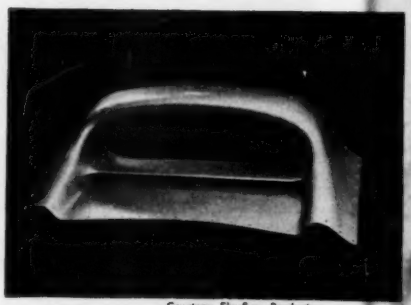
Internal Applications

The uses of plastics for non-structural internal applications in modern aircraft are so many and so varied that it is impossible to discuss them all here. There are, however, certain trends and innovations which indicate what the future may bring in the way of additional applications.

Electrical systems—Many pounds of plastics are used in the electrical systems of planes. Vinyl and polyethylene are used for insulation on most of the wire, and extruded elastomeric vinyl tubing is often used in conduits. There are many terminal blocks, usually molded of phenolic, and plugs and terminals molded of phenolic, melamine, or alkyd.

One of the most interesting trends in the use of plastics in electrical systems, however, is the substitution of plastics for metal in junction boxes as a means of cutting down weight and reducing costs.

The company which has probably gone furthest along these lines is Republic Aviation Corp. Most of the junction boxes and junction box covers in the F-84E are made of Fiberglas cloth or mat and polyester resin. More and more such parts are constantly being switched from metal to plastics, and the tendency

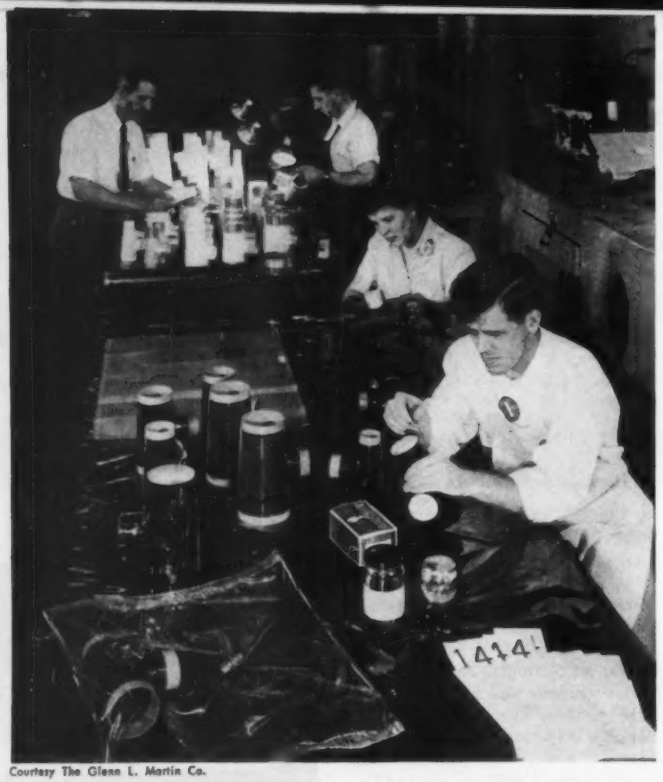


Courtesy Flexfirm Products

Oil cooler scoop for Douglas C124 is made of Dryply impregnated material

Courtesy Goodyear Aircraft Corp.

Polyester-impregnated glass cloth is used to make 450-gal. ballast tank for Navy lighter-than-air craft because the material is not corroded by sea water used as ballast



Courtesy The Glenn L. Martin Co.

Ducts for anti-icing system of Martin 202 transport are made by wrapping partially-cured phenolic-impregnated glass cloth on plaster mandrels and curing them in an oven

is to use mat rather than cloth wherever possible. In addition to the weight and cost advantages, the plastic boxes simplify insulation problems. Another advantage is the fact that the wiring diagrams can be molded-in to the box covers. Douglas makes a number of similar parts from Dryply, a polyester-impregnated glass mat or glass cloth material made by Flexfirm Products, El Monte, Calif. Grumman is making some junction box covers by post-forming phenolic laminates.

Ducting—Various plastics are used for air ducts, heating ducts, and other ducts. The air intake ducts used in Chance Vought jets have already been mentioned. Another manufacturer makes air conditioner ducts for a transport-type plane out of Fiberglas cloth which is impregnated with neoprene, formed into the desired shape, and then coated on the outside with phenolic to give it added rigidity. Another type of duct, used in the anti-icing system of the Martin 202 transport, is made by wrapping partially-cured phenolic-impregnated glass cloth on a plaster mandrel, curing it in an oven, and then breaking away the plaster form. Some ducts for Douglas planes are made of Dryply.

Shields and deflectors—Glass cloth and polyester are being used to make various types of shields, the most important of which is probably the large wing liners or anti-flowering shields which protect self-sealing fuel tanks from the jagged edges of bullet holes in the metal skin of the plane. These shields are usually made from large flat glass cloth and polyester sheets such as Plyon, made by Swedlow.

Among the other examples of shields is the 4-sq. ft. deflector in the nose wheel well of the F84E. This polyester and glass cloth piece keeps mud from splashing up into the wheel well and deflects spent shells from the wheel-lowering mechanism. Republic also uses polyester and glass cloth to make a number of rubbing blocks, wing fuel line support blocks, and chafing strips. One hinged two-part fuel line clamp has a wall section of $\frac{7}{16}$ inch.

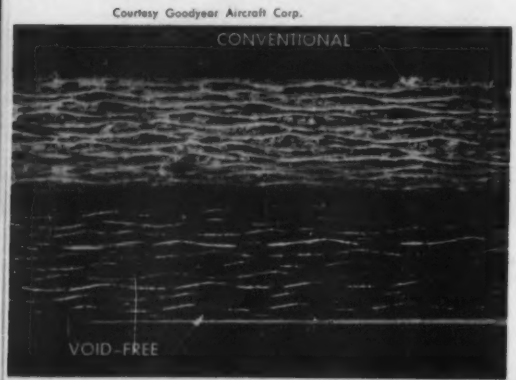
Ballast tank—One large and unusual internal application is a ballast tank for Navy lighter-than-air ships. The tanks, which hold sea water, are made in 250- and 450-gal. sizes by Goodyear Aircraft. The tanks contain a number of internal baffles made of the same polyester laminate used in the tank itself. The plastic is used because it is not affected by the corrosive action of the sea water, and because it is much lighter than metal.

Other applications—In addition to all of the foregoing applications, there are many others which cannot be discussed in detail. Many bulkheads and floors in bomber and transport aircraft, for example, are made of honeycomb sandwich constructions. Some of these will be covered in an article on honeycomb material which will be published in a near future issue of MODERN PLASTICS.

Decorative applications in transport-type planes include such things as vinyl-coated fabric wall surfacing, interior window frames, interior fairings, etc. A new flame-resistant grade of Royalite thermoplastic styrene-butadiene copolymer sheet material is just being adopted for some of those applications. It is, for example, being used for interior window frames in Convair transports, and for flight deck

(*Continued on p. 176*)

Courtesy Goodyear Aircraft Corp.



Relative absence of air pockets in void-free laminate as compared with conventional material is obvious in these two magnified cross-section views

Pump Housings Molded of Urea

PRESSURE and vacuum pumps with urea housings, designed for laboratory and industrial uses, have recently been put into mass production by George A. Thiberg, Cedar Knolls, N.J. Through the use of Beetle urea molding material, supplied by American Cyanamid Co., New York, N.Y., in the housing parts, the air pumps are quiet in operation, are small and compact in design, and can be produced in quantity while maintaining a high level of operating efficiency in the finished pumps. Boonton Molding Co., Boonton, N.J., is compression molding the parts.

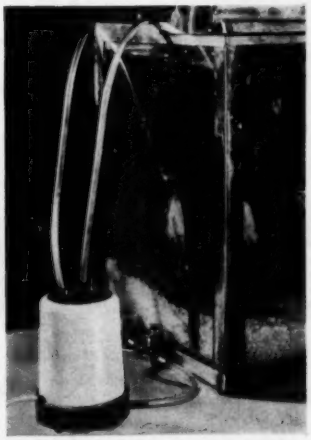
The two models comprising the Thiberg line of air pumps are housed in urea to provide the durability needed to withstand the strain of constant use. The first model, which is available in both pressure and vacuum types, has three urea parts—case, base, and small dial—each part being compression molded in a two-cavity die. The whole pump measures 4 in. in height and 3 in. in diameter. Model II is a pressure unit in a larger size, measuring 5½ in. in height and 4 in. in diameter. Again, each of the parts is compression molded of urea in a two-cavity mold.

Basic to the operation of the Thiberg pumps is a flexible rubber diaphragm connected to an actuating armature and held within the housing which also contains the necessary inlets and outlets and other mechanical parts. Alternating current is applied to an electromagnet, also mounted within the housing; the resulting magnetic field operates the armature which, in turn, causes the diaphragm to vibrate, thus providing the action necessary to produce the required pressure of vacuum. The device, completely enclosed in the durable urea housing, is approved by the Underwriters' Laboratories and operates on 110 volts A.C. It requires no oiling and is built for continuous operation.

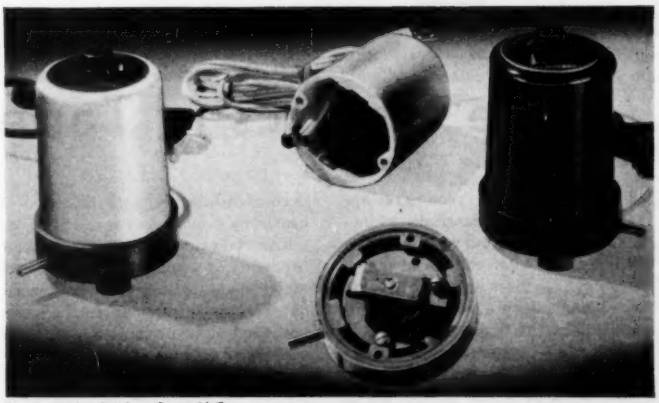
The pressure type of Model I delivers approximately 800 cc. per minute and a maximum pressure ranging from 4 to 6 pounds. It is used successfully as a pressure unit for aeration and water filter apparatus in connection with fish aquariums.

When supplied as a vacuum pump, Model I creates a vacuum of about 12 ft. of water, and has proved useful as a pump for circulating air or gases in a closed vessel. Some of the clinical uses to which it has been put in the surgical and hospital field are: intratrachel suction, thoracic surgery, bladder operations, abdominal distension, etc.

Model II has a much larger output of air, approximately 3000 cc. per minute, and will give a maximum pressure of 8 to 10 pounds.



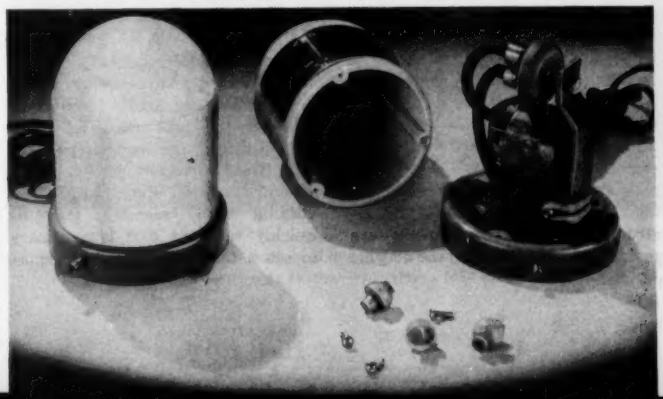
Urea parts contribute to quiet operation and compact design of pump for filtering and aerating water in aquarium

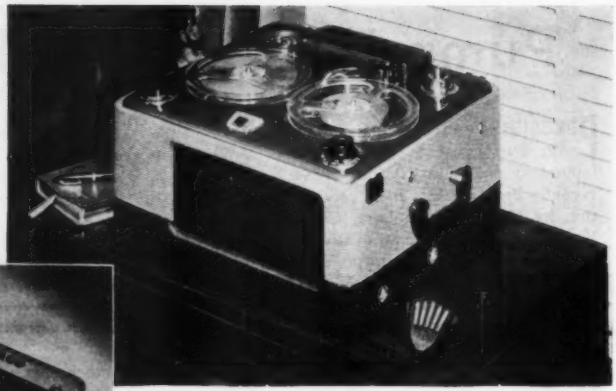


Photos courtesy American Cyanamid Co.

Small pump model can be had as air pressure (left) or vacuum type (right). Compression-molded urea parts (shown in center, disassembled) include housing (top), base (bottom)

Larger pump model has greater output than one shown above (3000 vs. 800 cc./min.) and a higher maximum pressure (8 to 9 lb. vs. 4 to 6 pounds). Mechanism is at right.





Right: Plastics parts contributing to the smart appearance and improved performance of new tape recorder include butyrate control knobs, styrene tape reels and carrying handle, acrylic components, and acetate tape

Courtesy Cruver Mfg. Co.

Left: Molded acrylic parts, run in clear transparent material, are decorated in two colors on reverse side. Top pieces form recording head cover. Center, left—three control knob escutcheons; right—volume indicator escutcheons; bottom—name-plate medallion

More Plastics in Tape Recorder

MAGNETIC tape recorders are using plastics materials in increasing amounts and in new ways. Although the total volume of material going into these units is still relatively small, future possibilities are indicated by the Web-Cor Electronic Memory "210" tape recorder, a product of Webster-Chicago Corp. In addition to conventional control knobs and a plastic carrying handle, this unit includes several acrylic components which are interesting from both the functional and appearance standpoints.

A closeup of these acrylic parts, molded and decorated by Cruver Mfg. Co., Chicago, Ill., appears in an accompanying illustration. Included in the group are three control knob escutcheons; a matching volume level indicator with a transparent window in the center; a decorative medallion carrying the Webster-Chicago shield; and two larger parts which cover the recording heads and tape transport mechanism of the instrument. All of these parts are molded of clear transparent acrylic, decorated from the back in gold and brown by a mask and spray method.

The translucent medallion also functions as a pilot light cover, and glows when the instrument is turned on. The three circular escutcheons are used in conjunction with dual control knobs (cellulose acetate butyrate and metal) on the tape direction control, volume and tone control, and output selector switch, which determines the power available from the output receptacles in the base of the recorder. This control is used when it is desired to operate a loud-speaker or public address system with the recorder.

Molded-In Lettering

Through the transparent center of the recording volume indicator appears a glowing light which shows whether the tape is being overloaded during the recording operation. The two largest acrylic pieces, mounted side by side over the recording head assembly, may be quickly removed if it is necessary to reach the tape transport mechanism. They carry the Webster-Chicago name as well as the Web-Cor trademark and the words "Electronic Memory" in script letters. All of the acrylic parts are run on 8-oz. injection equipment. There is a two-cavity die for the head cover components, another two-cavity for the decorative medallion, and a third die which produces one each of the four types of escutcheons on each press cycle.

Butyrate knobs used on the new Model 210 tape recorder are supplied by Rohden Mfg. Co., Chicago, while the brown styrene carrying handle is from Beco Plastics Co., Chicago. Tape reels, molded of clear transparent styrene, are produced by American Molded Products Co., Chicago. Also of interest is the fact that the tape itself, on which the recording is made, consists of a 1½-mil cellulose acetate backing with an iron oxide coating 0.00022 in. thick. With this type of instrument, the message may be played over repeatedly or may be magnetically "erased" for a new recording.

Printing on Vinyl Film

Over two-thirds of all vinyl film is printed. Six methods are used and, in this "panel in print," each of these methods is discussed by an expert

Printing Boosts Vinyl Film Sales

by Robert W. Riedel*

SINCE the commercial introduction of vinyl film in 1940, production has increased phenomenally, the 1950 film sales being in excess of 125 million pounds. One of the prime factors contributing to this growth has been the development of printing techniques, equipment, and inks to decorate the film. The importance of printing in the present market can best be judged from the estimate that almost two thirds—or more than 200 million yd.—of the film produced in 1950 was printed.

There are six methods of applying ink to vinyl surfaces, each of which has its own advantages as well as its limitations. All of these methods have drawn largely from processes of printing on paper and cloth, with the smooth, non-absorbent surface of the vinyl material offering special challenges to the ink maker and the machinery manufacturer. The following paragraphs briefly describe the six methods, touch upon the matter of printing costs, and outline the factors to be considered in selecting a method of printing on vinyl to achieve a specific result.

The versatile gravure method, first used to print vinyls in 1944, accounts for the largest printing volume at the present time, with its products suitable for almost all applications. In this method, special inks containing solvents, pigments, and vinyl resins are deposited on the surface of the plastic film from recessed designs in an engraved roll.

Two types of equipment are used in the gravure method. The *unit* or *rotogravure* type, adapted from paper printing, is made up of individual printing units set one behind another in series, with a separate unit for each color. The *drum* type, adapted from textile printing, consists of separate printing units for each color stationed around the circumference of a large impression cylinder. Both types are capable of producing a wide variety of effects, including fine-line half and quarter tones with delicate shadings, and "process printing" in which colors are superimposed to produce a photographic-like reproduction.

In the latter part of 1949, the *surface-* or wallpaper-type printing machine, consisting of as many as 12 printing units stationed about the circumference of a single large impression cylinder, was adapted to the printing of vinyl films. In this method, water emulsion-type inks

Color plates courtesy Bakelite Co.

Window curtains are an example of drum-type gravure printing on vinyl film (see page 84). Film printed by Toscony Fabrics, Inc.; curtains fabricated by Trio Curtain Corp.

* Sales and technical service, Vinyl Film Dept., Plastics Div., Monsanto Chemical Co., Springfield, Mass.

Color plates courtesy Bakelite Co.

Two examples of color printing on embossed or formed vinyl film. The Coryl film used is produced and printed by Decora Corp. Printing is done on a modified unit-type gravure vinyl printing press. One metallic color was used in printing the sample at the right

are deposited on the film surface from raised designs of an aluminum alloy roll. No color blendings, tonal gradations, or half tones are possible except with a separate print roll. However, since up to 12 separate full tone colors can be printed, a "handblocked" or "handpainted" three dimensional effect is produced which has met with wide favor in the drapery and bedspread field.

During recent years, an increased amount of *transfer*-printed cast vinyl film has been produced. This process features multicolor prints in perfect register. In transfer printing, a specially treated paper is printed with inks designed to have excellent "releasing" characteristics. When a film is then cast onto this surface, the print releases and becomes a part of the film. For applications permitting thinner gages where precise pattern registration is desired, as in cottage sets and for other kitchen uses, film printed by this method has gained wide acceptance.

Silk screen printing, introduced to vinyls in 1941, is a form of stencil printing in which the inks are forced through a cloth mesh in the desired pattern. A separate screen must be used for each color in this hand operation. Widely used for both single and multicolor printing where the volume does not justify roller production, this method continues to serve as a medium for artistic expression in such custom fields as the shower curtain and table cloth industries.

In 1950, *aniline* printing came into the vinyl film field. In this method, alcohol-type inks are applied to the film from raised surfaces or rubber-covered rolls with separate printing units for each color placed one behind another in series. After several hundred thousand yards of film had been printed satisfactorily, this method became the object of considerable interest due to its low roll cost and ink economy. Although most of the output has been of the woodcut type of design which has gone into drapery markets, it is claimed that this method is a real "comer" with an extremely bright future.

Printing Costs

Printing prices vary considerably due to such factors as total film yardage, number of colors printed, registration needed, quantity of ink applied, film width, cost of printing rolls, etc. Thus, it is not surprising to encounter prices of 5¢ per yard or less for printing a large quantity of film in one color with low ink coverage on gravure machines while at the same time 15¢ per yard or more may be quoted for small amounts of multicolor printing by the screen method. Since the price of 4-mil film is about 15¢ per square yard, the price of printing has a significant effect on the cost, and hence the selling price, of a finished item.

The costs of printing a given quantity of film by the various methods are approximately equivalent due to a series of factors which tend to offset one another. Examples are: a) The wallpaper-type machine uses cheaper inks and printing rolls than gravure, but applies a greater amount of ink and requires more rolls for a similar effect; b) In the transfer method the printing is cheaper, but the casting operation is a more expensive method of producing film than calendering.

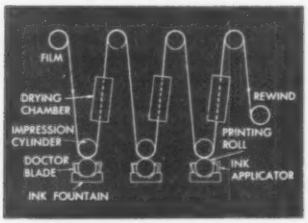
Thus, the selection of a method of printing vinyl film will depend on the market in which the printed film is to be sold; the type of pattern or design selected; the number of colors required; the type of finish (shiny or flat) desired; whether the material is to be fabricated electronically or by sewing; the gage, width, and uniformity of the film to be printed; the number of yards to be printed in one design; the speed of printing needed; whether or not it is desirable to have tissue interleaving or dusting; and whether or

not the design is likely to become standard and to be repeated from season to season.

More specific details of the six basic methods of printing on vinyl film and sheet are discussed in the following group of articles, each of which was prepared by an expert in one of the methods. A partial listing of manufacturers of printing presses will be found on page 198.

Unit-Type Gravure

by William H. King*



IN the decoration of vinyl film, the No. 1 problem is to insure a "dry" printed surface so that ink will not rub off or stick to the next layer in a folded article or roll.

The rotogravure or unit type of printing press, with oven drying after each color and before the next color is printed, represents one of the best answers to this problem. This is proved by the fact that millions of yards of material have been printed in three and four colors without interleaving tissue and with no rubbing or sticking. This has cut printing costs and has relieved vinyl fabricators of the headache of disposing of the tissue.

The machines themselves are the same type as used for printing paper, and are extremely versatile in that they can be used to print other materials besides vinyl. Unfortunately, this versatility makes this type of machine more expensive than other types used for printing vinyl film.

Various decorative effects can be produced with the unit-type gravure printing press. Process work—which consists of utilizing the three primary colors, red, yellow, and blue, to get the colors desired—produces some of the outstanding results. Combining

* President, Multicolor Gravure Corp., Holyoke, Mass.

MEMBERS OF THE PANEL

ROBERT W. RIEDEL is in charge of technical service and development and military applications of Monsanto's vinyl film. He was graduated from Yale University School of Engineering in 1942 and has been with Monsanto since that time, with the exception of three and a half years spent in the Navy.

WILLIAM HENRY KING, president of Multicolor Gravure Corp., is a graduate of The Wharton School of Finance of the University of Pennsylvania. He was experienced in the production of machine tools when he joined Multicolor in 1946. He was named president of that company in 1950.

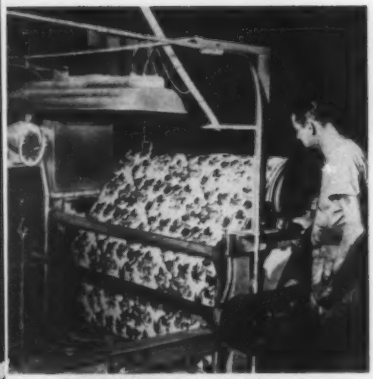
BERTRAM H. ALLISON is in charge of the chemicals development group of Toscony Fabrics, Inc. He has a Master of Science degree from Stevens Institute of Technology. Before joining Toscony in 1948, he was with the American Hard Rubber Co., the plastics division of Du Pont, and National Carbon Co.

W. W. BOLTON, president of Dalbolt, Inc., was in the wallpaper business before World War II. He was sales manager of York Wallpaper Co. and, later, vice-president and sales manager of Gilbert Wallpaper Co. After serving three and a half years in the U. S. Navy, he and F. J. Daley formed their present firm.

IRWIN B. NATHANSON has been manager of the plastics division of Cohn Hall Marx Div. since that company entered the vinyl field in 1947. He is a graduate of George Washington University with a B.S. in Chemical Engineering and has been with the Plastics Div., General Electric Co., and Monsanto Chemical Co.

PHILIP WHITING is technical director of Marvellum Co., which specializes in printing by the surface and aniline methods. He is a graduate of Lehigh University and served with the U. S. Army in World War II. He has been with Marvellum since 1946 and was named to his present position last year.

FREDERIC HICKS, president of Hicks & Otis Prints, Inc., was trained as an artist. He became interested in silk screen printing and was employed by several textile printing firms. Hicks & Otis Prints, Inc., founded in 1935, has engaged in printing on pyroxylin-coated fabrics, vinyl-coated silks, and rayons.



Courtesy Multicolor Gravure Corp.

Take-off end of unit-type gravure press printing vinyl film in several colors

this with full, half, and quarter tones of each of the three colors means that an infinite variety of tones and shades can be achieved. White or black or a solid ground color can be used for even greater variation.

It must be said, however, that the number of color combinations is limited by the usage of only the three primary colors. In choosing the best method of executing a design of many colors, the originator of the design must decide whether he wants fine detail and limited color change, or less detail but a different effect and varied color changes, which the surface-printing method (discussed below) can give.

"Fall on" work which consists of full, half, or quarter tones of one color falling on top of any depth of tone in another color is handled excellently on a unit gravure machine, because the first color is absolutely dry before the second color is applied. This makes for a clean, well detailed print with no smudging of the underneath color by the top color.

All-over background printing or "blotch" printing, as it is known, requires a heavy layer of ink for good over-all coverage. Again, the drying cycle used with this type of press handles the requirement satisfactorily. The usage of a white underlay on dark-colored film necessitates a deep layer of color deposits so that the colors on top of the white be as bright as possible. This has been developed to a point where fine details are not lost.

Extremely fast drying inks "set" a very fine line of ink immediately as it hits the vinyl in the printing unit. This enables texture weaves to be reproduced.

Another fast-growing decorative effect is the printing of embossed film. The ability to lay on and dry a heavy ink deposit makes this feasible.

In vinyl film printing with this process, film gage differentials and other defects can be corrected up to a certain point even in four-color work up to 54 in. in width and large repeats up to 100 in. width. Batches of film which other methods of decorating cannot handle, because of wrinkles, "belly," or slack edges, have been successfully processed with no loss to film maker or customer and with high quality results. This is due to an ability to control each printing unit individually and, therefore, make allowances for trouble.

Running on a specially developed carrier sheet, the film is made to conform to the carrier with little strain or stress under ordinary circumstances. Any film or sheeting from 1.5 to 20 mil can be handled with a minimum of adjustment.

These machines use etched, milled, or pantographed copper or steel rolls, chrome plated for protection against design wear. The initial cost of milling and etching is rather high, but a good engraving (if properly cared for in the press) will last as long as the most popular design will require printing.

Inks used are very fast drying and do not have to be plasticized in order to give a good printing result which will withstand abrasion tests. When decorating heavy sheet, a top coat for higher gloss and better abrasion resistance (in case of upholstery usage) is often desirable. This is applied in the same operation with an extra printing or coating unit.

The problem of being able to get constant register on 54-in. multicolor prints has meant a big conversion job, but unit color dry printing gives such a clear result, and the carrier and drying units give such constant good quality on good films with very low waste that we feel the expense of this type of equipment is justified.

If the present short supply of materials results in inferior quality films, it will be advisable to use interleaving tissue on unit-type machines. Further, excellent results are also obtained in such cases with special dusting equipment and dusting powder. All of these precautions must be taken when inferior film is being printed, no matter how dry the printed result, as some plasticizer migration is going to take place.

The same rotogravure press that is used for direct vinyl printing is also used to give excellent results in the "transfer" or "decal" process used to produce decorated cast film. The function of the press is to print a "decal"-type paper with vinyl inks of a slightly different type than are used for direct printing of vinyl film. The result is that the printing is resting on a "release" coat and can be transferred from the paper by several methods.

Another offshoot of direct vinyl printing is the printing of coated vinyl fabric, used for table cloths and lawn furniture.

Drum-Type Gravure

by Bertram H. Allison*

WITH the advent of unsupported vinyl film, it was found that the drum-type textile printing machine could, with modifications, be adapted to continuous printing of the film. By this method, it is possible to print many types of vinyl film from the thin 3-mil calendered film to the 12- and 20-mil calendered sheeting in widths ranging from 36 to 75 inches. Speeds as high as 100 yd. per minute are possible with an ink coverage up to 100% of the film surface.

Printing vinyl film on the drum-type machine embodies such advantages as very good registration con-

* Chief, Chemical Development Group, Toscony Fabrics, Inc., Passaic, N. J.

trol and ease of changing patterns and ink colors. The sizes of repeats which can be printed by this method range from 15 to 100 in. or more.

One of the limitations of the textile machine is the short span for drying between colors in multicolor work. This in turn tends to limit the number of colors which can be printed. This fact, however, is not actually detrimental since the half tones and quarter tones of each color, which can be obtained by using the proper engravings, and the various shades produced by colors falling on one another, result in many more shades than the basic ones which are actually printed by each engraving. Another limitation is in the cost of the copper engravings used in the process.

Because of the wide variety and style of patterns and their many end uses, as well as the quality which is produced by the drum-type textile machine, vinyl films printed by this method find their way into many of the higher price as well as low price markets. Because of the flexibility of the process, printing costs are relatively low and compare favorably with other available methods.

In gravure printing with the drum-type textile press, many interesting decorative effects are possible. These include fine line prints such as the lace-type low-coverage prints for kitchen and bedroom ensembles, the very delicate multicolor medium-coverage prints with their many half and quarter tones for use in all parts of the home, and finally, the blotch-type, single and multicolor high-coverage prints, which find a place in the vinyl drapery field. In addition, it is possible to print with the three primary colors, allowing them to fall one on top of the other to produce a complete line of brilliant colors. This is commonly called process printing.

An interesting material which is also processed on the drum-type machine is the 12- to 20-mil vinyl sheeting which is popular for upholstering furniture and for use in the luggage trade. Film printed by this process is also readily embossed to produce a pleasing three-dimensional effect which is creating a great deal of interest for various uses in the home, in addition to applications in the upholstery and luggage trade.

The most satisfactory type of printing roll for this process is the chrome plated copper roll. The chrome can be replaced as it wears and the upkeep of rolls thus reduced to a practical figure. The original investment for each design, however, especially in the large repeat patterns, is high in comparison to the rolls used in surface printing and the screens used in screen printing.

The inks used in the drum-type textile machine are of the usual vinyl base composition containing finely dispersed pigments and fillers to produce excellent colors and excellent stability characteristics. It is important that the drying rate and viscosity of the inks be carefully controlled to produce the many color shadings which can be obtained by gravure printing, and still obtain a tack-free ink surface. This is easily accomplished by using solvents having different drying rates.

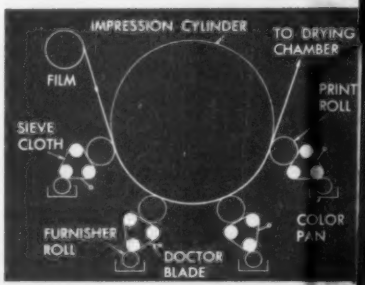
The inks used must also have excellent adhesion to the vinyl film. The composition of the film itself—that is, resin, plasticizers, stabilizers, and other minor ingredients—must be of the right type. If not, loss of adhesion, locking of ink during the fabrication of finished products, and many other problems may be encountered. Provided proper materials are used and the machine operated correctly, there is no need for top-coating the printed film with a high molecular weight, tack-free material for complete sealing of the surface. The one exception is found in heavy-gage sheeting where it is necessary to give consideration to greater abrasion resistance and higher gloss surfaces than are normally required on the light gage films.

In the fabrication of film printed on the drum-type textile machine, difficulties such as edge curling, stretch, sticking, and blocking are often encountered if careful thought has not been given to minimizing their effects. By carefully designing the pattern and by slight modifications of the printing ink, it is possible to reduce edge curl of the film during both the printing and fabricating process. Sticking and blocking of the prints are also controlled by properly formulating the printing ink used and by incorporating highly efficient ink drying facilities in the printing process. In practice, very little difficulty is experienced from these sources.

Stretch in the vinyl film is an important factor which has caused many complications for the fabricator. By continually improving the printing equipment, this condition has been greatly minimized. On many of these machines elaborate belts or carriers have been installed so that practically no stretch is introduced into the film during printing and drying.

Surface Printing

by William W. Bolton*



SURFACE printing, sometimes known as "kiss printing," is best described simply as mechanized hand block printing. In this type of printing, the ink is transferred to the product from a raised surface; this, of course, is quite the reverse of conventional gravure work. Because of the ability to imitate hand block work, even to the halo effect around the individual deposits of color, the imitation of high-style fabrics of all types has been the immediate aim of the technique of surface printing.

Surface printing of vinyl film in volume yardage is about 15 months old, and the greater majority of this yardage has been used by drapery manufacturers. However, in recent months there has been a great deal of activity in designing and producing cottage and kitchen sets, shower curtains, table cloths, wall coverings, and upholstery and slip covers.

Depending on the quality of the vinyl, up to 12 basic colors can be surface printed simultaneously, at speeds ranging up to 350 ft. per minute. Higher speeds can be obtained in low color work. Virtually all of the printing done up to this

* President, Dabolt, Inc., Keene, N. H.

Courtesy Dobell, Inc.

Wall-paper type machine producing decorated vinyl film by surface printing

time has been concentrated on widths ranging from 27 to 36 in.; there are, however, many patterns being processed at this time in the 46- and 48-in. widths. Printing on 54 and 60 in. is inevitable.

Printing on the wider widths—those widths beyond 40 in.—is more expensive because of slower running speeds, higher cost of print rollers, longer setup time, and longer washup periods. But these wider widths open up a new field for multicolor work, mainly because of the demand for pure basic opaque colors on clear film and for lamination for furniture and wall coverings. It must be remembered, however, that in all surface printing it is impossible to print to the extreme edge of the film.

Because surface printing is done with virtually no tension, there is a complete lack of curl other than that which is natural to the film itself. This also makes it possible to print successfully all gages of calendered vinyl from 2 to 22 mils. Higher gages could, of course, be printed. Cast film of 1.5 mils has been successfully printed. An even sheet, thickness-wise, without slack edges, insures the best printing job regardless of gage thickness.

Registration also is a secondary problem in surface printing because of the lack of tension. Once the pattern is in fit, and the film itself is within the accepted standards of thickness and strain tolerance, the printing rarely shows any signs of being out of register. With surface equipment, the above fact plus the absence of a doctor blade in the printing operation results in a low percentage of waste or seconds.

Offset is a different problem. It is necessary with the print inks now employed to use interleafing tissue with every yard of film printed. This is true, however, only in the printing operation itself. After several days the inks become so cured that there is no further danger of offsetting. The surface printers have been advised, however, that they may expect in the very near future to have inks which eliminate interleafing.

The inks currently used in surface printing are, for the most part, of the water emulsion type. They pass the required standards and washability tests for shower curtains and similar-type products. As far as sunfastness is concerned, they are far beyond anything required in the textile business itself, sometimes exceeding 200 hr. in the fadometer. These inks also contribute largely to lack of curl in surface-printed vinyl film.

Water-emulsion inks can be affected by plasticizers and stabilizers that may be unstable or migratory in the film itself. However, if the film meets with the standards set up by leading calenderers, this fear can be eliminated.

The colors are not affected by excessive heat, and they maintain complete opacity even when printed on colored films. For example, it is perfectly possible to get clean white coverage with these inks even on black film.

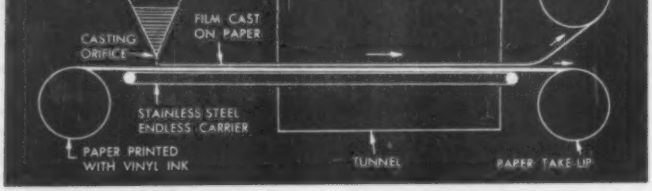
When clear film is printed with surface-type equipment, the colors on the reverse side of the film maintain their full bloom. This is also true when clear film is laminated to a printed opaque film. If anything, lamination and embossing of the printed film emphasize the brilliance and opacity of the printing.

A peculiarity of surface printing is that embossed surfaces can be printed with greater ease than can flat sheet. The coverage of the hills and valleys of the embossing is complete and without shading. This would also be true of any other mechanical or chemically distributed surface effect.

The rollers or blocks, as they are known, used in surface printing, are cylinders of metal alloy, one of which is required for each color printed. They are routed out to the exact designs of the artist's drawing, with the raised printing surface completely smooth. These rollers are highly durable and have been known to print more than 5 million yd. of vinyl sheeting without any serious defects.

Transfer Printing

by Irwin B. Nathanson*



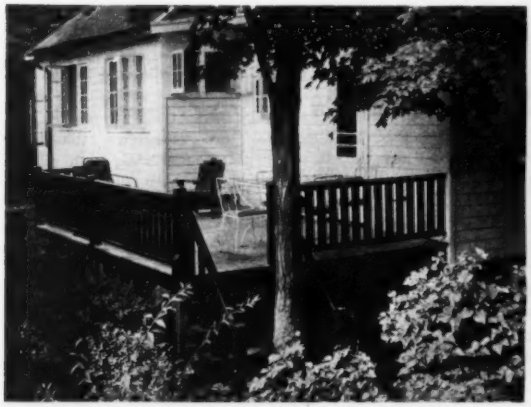
IF YOU remember the decalcomanias of your childhood days, then you know the basic principle of the ingenious transfer printing process. The printing design originally exists as a painting in the possession of the convertor or customer. This painting is sent to a photo-engraver who engraves the pattern on copper rolls exactly, with certain minor refinements, as though it were for

(*Continued on p. 186*)

* Manager, Plastics Div., Cohn Hall Marx Co., New York, N. Y.

Translucent Porch Roof made of corrugated

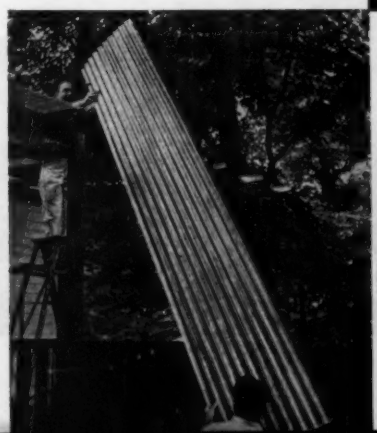
sheets of fiber glass mat and polyester resin provides shelter without cutting out light



Unsheltered porch on west side of home in suburban New York was a convenient place for outdoor dining. But cushions on the furniture had to be taken in every night to keep them out of the rain, and the porch was constantly littered with twigs, acorns, and leaves from overhanging trees. An ordinary roof, however, was undesirable because it would have darkened the rooms which get their light from windows opening onto the porch

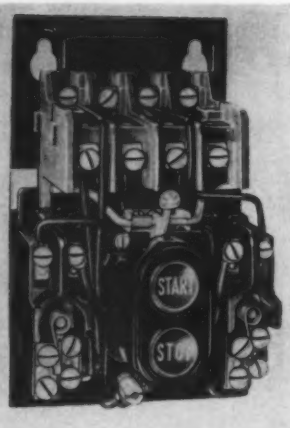
Problem was solved by installation of roof made of corrugated sheets of Fiberglas mat and Laminac polyester resin. Cushions can be left out all the time, the porch is free of debris, casement windows can be left open when it rains, and the porch is almost as light and bright as before. The Corrulux sheets used, made by Corrulux Corp., Houston, Texas, are forest green and match the porch railing and trim of house

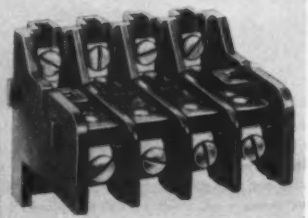
Corrulux sheet 12 ft. long and 2 ft. wide weighs only 12 lb., is therefore easy to handle. When necessary, it can be cut with the same saws used to cut wood or metal (right) or can be cut with metal shears. Eight such sheets were used to make the translucent roof for the 11- by 16-ft. porch



Framework for the roof was made of 2 by 4 rafters, spaced 24 in. on centers, running from wall of house to stringer set on three 4 by 4 uprights. Corrulux sheets, overlapped one corrugation at joints, were nailed to the already painted framework with rustproof nails

Case Histories





Magnetic motor starter is rated higher because of electrical values of alkyd compound used to mold terminal boards

WHEN the now two-year-old alkyd molding compound was first announced[1] an extremely bright future was predicted for it, particularly in the electrical and electronics fields. Many of the predicted applications have materialized, and now the future of alkyd molding compound is brightened still further by the fact that uses to date have been in essential civilian applications—uses which are also of utmost importance because of their implications to the mobilization program.

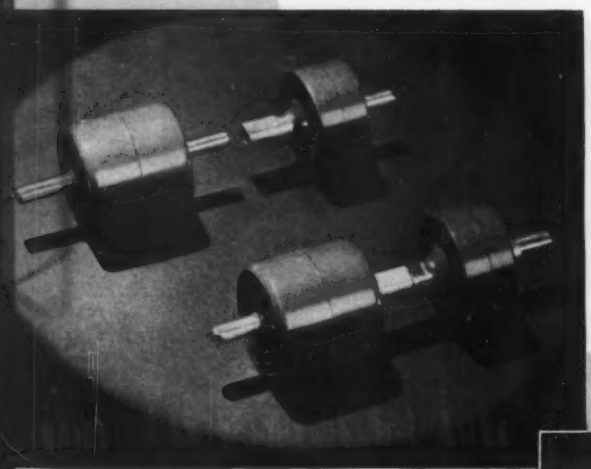
Important properties of alkyd molding material are its high-speed, low-cost molding requirements, excellent electrical properties, high heat resistance, dimensional stability, and low water absorption. In the category of electrical properties are: greater arc resistance than any other plastic material; high dielectric strength; high dielectric constant; excellent resistivity; and low loss factor.[2]

The difference between molding requirements of alkyd[3] and other thermosetting materials has caused four molding press manufacturers[4] to develop special presses for molding the material. However, a number of molders have found that alkyd material can be satisfactorily run, for many jobs, on standard compression presses; in fact, the bulk of present applications is being so produced. It is only when the highest possible production rates and cost savings must be realized that the faster, more economical new presses become essential to the handling of the material.

At the present time the alkyd molding compound is supplied as a mineral filled polyester resin in granular (Plaskon alkyd 420) and putty (Plaskon alkyd 411) forms. The two compounds have virtually the same properties, with the putty type being supplied to those molders who desire a material which can

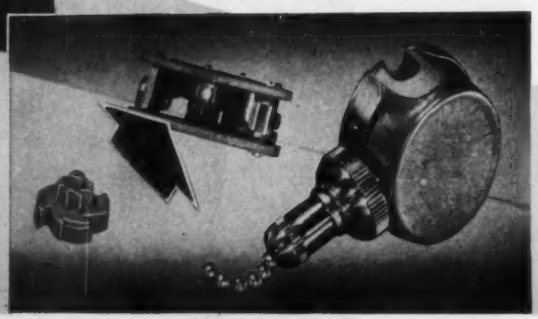
[1] "Alkyd hot molding compounds," by Dr. Maurice H. Bigelow, MODERN PLASTICS *26*, 85 (Oct. 1948).

[2] "Alkyd molding compound goes to work," by H. W. De Vore, MODERN PLASTICS *27*, 81 (Nov. 1949).
[3] "Mineral-filled alkyd," MODERN PLASTICS *28*, 85 (Dec 1950).
[4] Baker Bros., Inc., Toledo, Ohio; F. J. Stokes Machine Co., Philadelphia, Pa.; Elmes Engineering Div., American Steel Foundries, Cincinnati, Ohio; and The Denison Eng. Co., Columbus, Ohio.



All photos courtesy Plaskon Div.

Rejections were reduced substantially and the life of molding dies increased when alkyd was chosen for filter capacitors shells for high-voltage power supply



Rachet (left) which actuates contact parts of pull-chain type light switch is molded in single piece of alkyd. Plastic component replaces two-piece assembly previously employed which required two materials

# of ALKYD Molding

How the newest thermosetting plastic material is being used in a number of electrical applications. New material production facilities are being constructed

by H. W. De VORE* and H. C. MURRAY†

be molded at extremely low pressures because of the presence of delicate inserts or similar conditions which make low pressure molding essential. The putty type is being molded at from 200 to 600 p.s.i.; in fact, it has been molded at pressures below 200 p.s.i. on some jobs.

Because of its excellent electrical properties, alkyd molding compound has already found its place in the production of capacitors, resistors, tube bases, automotive coil tops, motor starters, television tuners, television tube sealing rings or brackets, and control instruments and devices. Case histories of a few of these uses will serve to point up the thinking that the industry has been doing about alkyd molding compound, and to amplify its merits.

Magnetic Motor Starters

In a line of magnetic motor starters produced by Furnas Electric Co., Batavia, Ill., the terminal boards are being molded of alkyd compound. The resulting boards have the required electrical properties in high degree, and, in addition, Furnas has been able to achieve substantial savings in production costs.

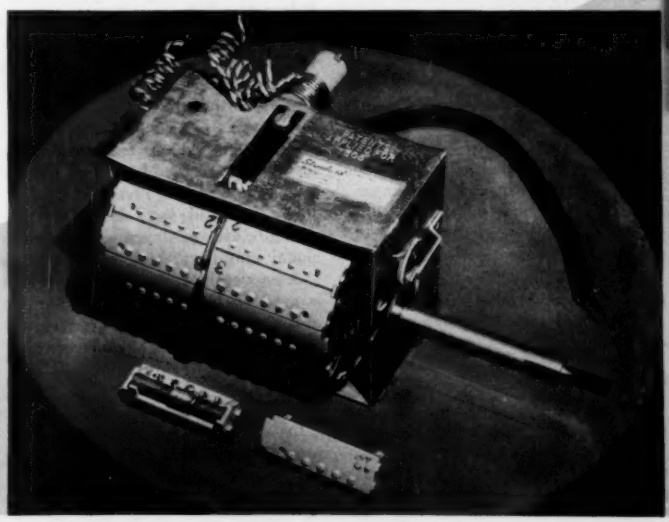
Using a two-cavity mold to produce these terminal boards, more alkyd parts are molded in an 8-hr. shift than were formerly turned out with another material in a six-cavity mold. This higher production resulted in reduced labor, mold, and press costs per piece. Production time was cut 50%, and over-all cost of the piece was reduced 25 percent.

Because of the high arc resistance and insulation value of the alkyd material, it was possible to give the resulting motor starter a higher rating; it could perform with greater efficiency and carry greater loads than previously possible. This higher rating was made possible without increasing the wall section because of the plastic material's greater resistance to arcing while also serving as adequate insulation for the higher currents involved.

Capacitors

Shells for high voltage and other types of capacitors are being molded of alkyd for Centralab Div., Globe Union, Inc., Milwaukee, Wis. Centralab reports that this molding is being done with appreciable labor and equipment savings. Because of the lower molding pressures required by alkyd, the life of molding dies has increased.

The capacitor shells were first molded on regular compression presses which were later modified to give faster action. Equal success



Dimensional stability of alkyd makes it highly suitable for television tuner strips whose 3/16-in. sections require close tolerances

* Product manager and † technical service representative (alkyd molding compounds), Plaskon Div., Libbey-Owens-Ford Glass Co., Toledo, Ohio.

Savings have been realized since alkyd was chosen for parts of watt-hour meter

Magneto rotor production costs are cut in half when parts are molded of alkyd

in molding alkyds is reported on pneumatic and hydraulic presses. In all cases, essentially the same dies and equipment were used that had been used for molding phenolics.

One of the electrical advantages found by Centralab was a reduction of 70% in rejections when the capacitor assemblies are subjected to a high voltage breakdown test. This important saving also points to the fact that an improved product is being made.

Magneto Rotors

Rotors for magnetos for use in farm and industrial engines are being molded of alkyd by The Barber-Colman Co., Rockford, Ill., for J. J. Case Co., Racine, Wis. These magneto components demand a high degree of electrical insulation and a non-tracking material.

The rotors are being run with alkyd compound in a three-cavity compression mold on a 15-ton conventional hydraulic press. An over-all saving of 50% in the cost of the part is reported as the result of the use of alkyd molding compound.

Television Tuner

Molding of parts for a television tuner which demand high dimensional stability was reported in MODERN PLASTICS, Nov. 1949, page 81. This application of alkyd molding compound has more than adequately proved itself by the fact that, at this writing, over 50 million individual pieces have been made.

The television tuner requires 24 molded pieces for each unit. These parts are $\frac{3}{16}$ in. in section and must be molded with tolerances of ± 0.0005 inch. They are cured in 16 sec. to give an over-all 20-sec. molding cycle.

The molded alkyd parts for the television tuner are being produced for Standard Coil Products Co., Chicago, Ill., by Wilcox Plastics, Los Angeles, Calif., and Mayfair Molded Products Corp., Trans-Matic Plastics Co., and Central Molded Products Co., all of Chicago, Ill. Special alkyd molding presses are being used by Wilcox and by Trans-Matic; conventional compression presses are used by the other molders. Wilcox, using an eight-cavity mold, produces 1440 parts per hour.

Automotive Coils

Ceramic was the only material which Mallory Electric Corp., Detroit, Mich., found to be satisfactory for automotive ignition coil tops, until it switched to alkyd molding material. Now, these molded plastic tops, produced for Mallory by Great Lakes Plastics, Inc., Plymouth, Mich., safely pass all tests for dielectric strength, arc resistance, and dimensional stability at high temperature.

A conventional compression press is used by Great Lakes, running at an over-all molding cycle of 80 seconds. The molder also reports very low tooling costs on the job.

Light Switches

In small pull-chain type light switches produced by McGill Mfg. Co., Valparaiso, Ind., a small ratchet is used to actuate the contact parts of the switch. It was previously necessary to make this ratchet of two materials in order to obtain the required arc resistance and non-tracking properties. This two-piece assembled part has now been replaced by a one-piece ratchet molded of alkyd by Tietz & Baur Plastics, Inc., Melrose Park, Ill.

The switch using the new alkyd ratchet received Underwriters' Laboratories' approval after successfully completing 24,000 operations under maximum load and an overload test of 150% capacity for 100 operations. So successful has been the alkyd application in this switch that McGill unconditionally guarantees the switch against failure. The unit is rated at 6 amp., 125 volts.

Watt-Hour Meter

Automatic molding presses are being used by Blakeman Bros. Electric Mfg. Co., Los Angeles, Calif., to produce the molded alkyd parts used in commercial- and residential-type watt-hour meters. According to the manufacturer, it has not had one operating failure, since using alkyd material, which would necessitate replacement of the meter. At the same time, the percentage of breakage during assembly has been considerably reduced.

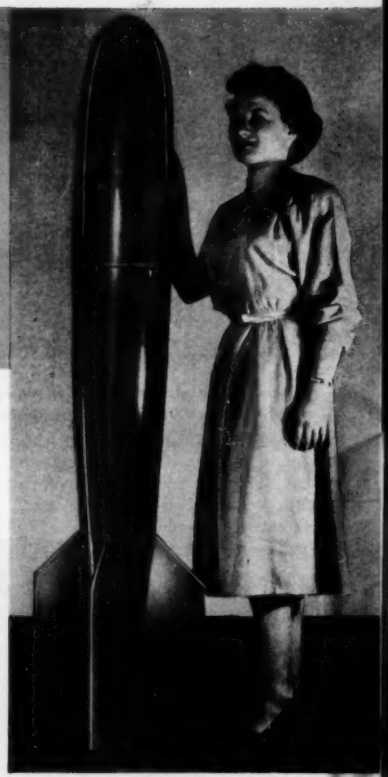
In a report from the manufacturer, it is stated that tooling cost for the operation is about one-third that required for other materials, and that production demands can be met with fewer mold cavities because of the reduced cure time. Also, because automatic presses are used, it is found possible to have the press operator perform a riveting operation while attending the press.

Other Uses

In addition to civilian products molded of alkyd that may go into defense usage—as will most of the electrical and electronic applications now being made of the material—alkyd compound is presently being used in classified military uses.

With such essential types of product applications, it is to be expected that DO priorities will prevent any material shortages of alkyd compound. In fact, Plaskon has recently announced that it is building a new plant to produce the compound. With these new facilities, scheduled for completion soon, the firm foresees a good supply of the material.

The Promise of REINFORCED PLASTICS in Defense



Courtesy Winner Mfg. Co., Inc.

Tow bird for Navy planes is an example of long closed piece made in two parts

PART 2

THE interest of every development and procurement branch of the Armed Forces in glass-reinforced polyesters is intense. The reasons are obvious: a) the strength-weight ratio of products and parts made from these materials; b) the fact that test prototypes can be made inexpensively with assurance that later production pieces will be relatively the same in properties; c) the unlimited size possibilities of polyester moldings; d) the electrical and electronic properties of the materials; e) their thermoset nature.

During the past five years, several military materiel laboratories have been steadily working with molders and with resin and glass researchers on development projects. Three of one kind of boat, a dozen sleds, six cases of a certain kind, a few of this item, and several of that were made by different methods and to varying specifications for test and evaluation under toughest field conditions. By these means a typewriter case, for example, was produced in test quantities by mat forming with diaphragm pressure in a low-cost mold, whereas the job in mass production would be done from preformed reinforcement in matched metal molds on a compression press. The cost of this development work was small compared to what it would cost to do it now! On literally scores of items specifications are complete and know-how established.

Naval Craft

Take boats as a case in point. In 1948 the Bureau of Ships had three 28-ft. 9-in. polyester glass mat personnel boats made by Winner Mfg. Co., Inc., at Trenton, N.J., as part of a development program that began in June, 1946. These three boats were made by layup in a huge aluminum female mold with resin sprayed on and pressure then applied by air pressure in a rubber membrane. In 1949 another experimental contract was placed for three boats to be made by the Marco method shown in the illustrations on page 92. These six boats have now been extensively service tested and have stood up to full Navy punishment.

Specification Issued

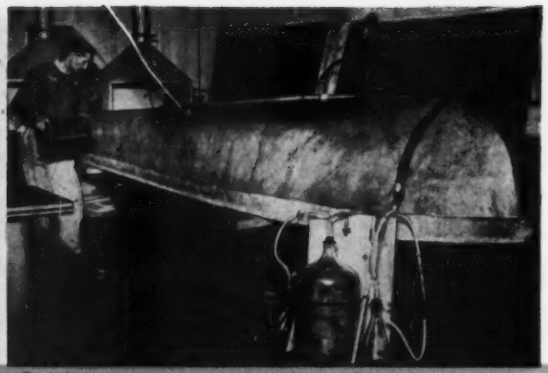
From this and other development work came Navy specification MIL-P-15615 (ships), issued in August, 1950, for low pressure thermosetting resins and glass mat reinforcements. Resins are specified as room temperature curing. Mat is to have a weight of ¾ oz. per square foot.

The Navy had six LCVP's each 36 ft. long made last year, three by Marco, Akron, Ohio, and three by Anchorage Plastics Corp., Warren, R.I. These are currently under test. They are behaving so well that a production program on more of them is under way at the Puget Sound Naval Shipyard. The importance of this and other development programs becomes obvious when it is considered that these huge boats can be made at the rate of one a day—or five to six times as fast as they could be made out of any other materials. And man-hours are as vital as materials in this mobilization program.

The Coast Guard is having molded at Lunn Laminates, Inc., Glen Cove, N.Y., a 26-ft. double-end life boat. An interesting feature of the process is that the female mold was made of polyester-glass mat formed around a wooden life boat.

Other branches of the service

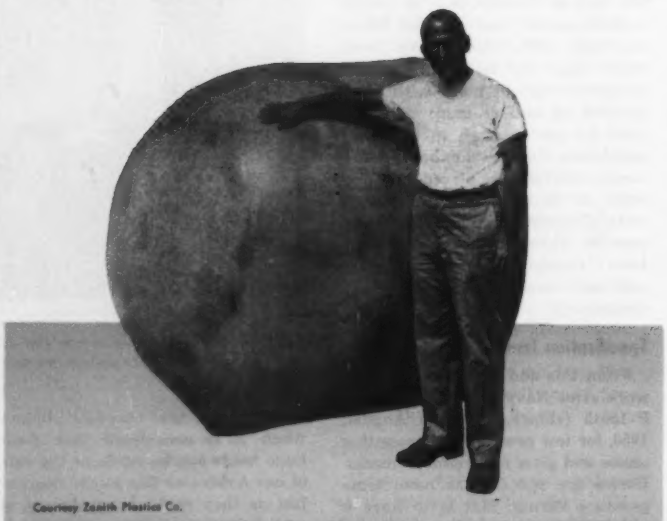
In Part 1 of this series of three articles, published last month, were discussed the polyester resins and types of fibrous glass reinforcements now available. In that article, some general conclusions were drawn regarding military potentialities of reinforced plastics. In Part 2, the future possibilities of present development programs are detailed.



Photos courtesy Marco Chemicals, Inc.

In Marco method, glass cloth is laid up dry, eliminating the necessity of handling sticky cloth. Here cloth is laid up on male mold

After mold is closed, self-curing resin is poured into the trough on male mold, then drawn into the mold by vacuum and held there while it cures



Courtesy Zenith Plastics Co.

Large radome for Navy patrol plane (the Lockheed PO-1W) is produced by new method involving wet layup of glass fabric reinforcement impregnated with liquid polyester resin

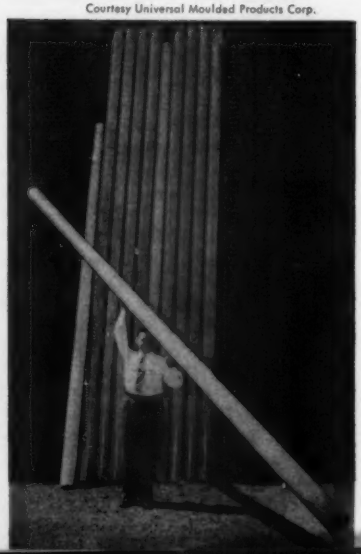
ers learned about mass production and low costs from the molders who had to make things fast and economically to stay in competitive business. The famous plastics baby of World War II had to find its place in peacetime markets in order to be in a position to do a real job in the present defense activity!

Refined by Specialists

In reinforced plastics molding today there is used a greater variety of methods and equipment than in any other part of the Plastics Industry. But, because some companies found certain markets more lucrative than others, men in these

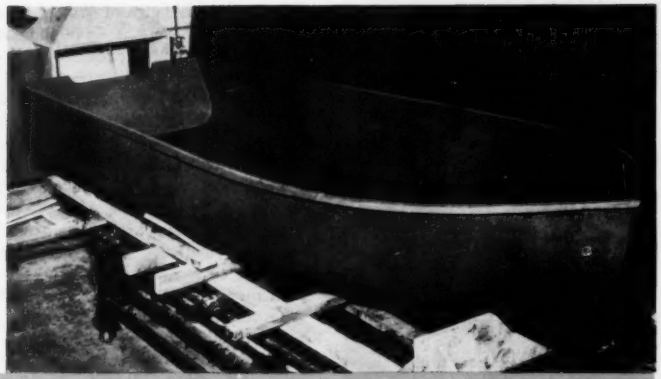
One man can easily lift 20-ft. length of 6-in. i.d. reinforced polyester pipe

Courtesy Universal Moulded Products Corp.



have been doing the same sort of development work. At Fort Belvoir the Corps of Engineers has been working on glass-reinforced polyester pipe. Both Army and Navy Ordnance Labs. have been studying tubing. At Wright Field, Dayton, Ohio, the Air Force has pursued its great program on radomes, swapping findings with the Navy Aeronautical Development Lab. at Johnsville, Pa., and with the Signal Corps at Forth Monmouth, N.J. Where interests are mutual, interdepartmental steering committees have been established to coordinate efforts.

Meanwhile, molders and laminators have been gaining experience—and putting it to profitable use in consumer and industrial applications. Resin makers, having produced a material for a special military need, often found a quantity market for it in civilian molding enterprises. The same thing goes for new forms of glass reinforcement. Conversely, the military research-



Boat molded by method shown on opposite page, after being taken from mold. The hull is void-free, of controlled thickness, and needs little or no finishing after molding

companies specialized and so were responsible for refining certain techniques. In each case milestones of accomplishment mark the progress.

Examples are legion. In the development of polyester pipe U. S. Plywood Corp. pioneered as far back as 1945. Today an installation of its Glasweld pipe is being made on a destroyer. This pipe is made in two types: a convolute tube made by wrapping glass cloth around a metal mandrel for longitudinal and circumferential strength; and a spiral tube made by helically winding glass tape on a mandrel to produce a pipe with a bursting strength twice that of its longitudinal strength.

Universal Moulded Products Corp., Bristol, Va., is producing 6-in. airborne gasoline pipe-line pipe on a development contract. The company uses cloth and rovings wound on a hollow steel mandrel. The reinforcement is then impregnated with resin and the wind-up wrapped first in cellophane and then in heavy paper. The steel mandrel is then plugged, and steam is circulated through it, curing the resin while shrinking the cellophane to provide pressure. When cure is completed, cold water is sent through the mandrel, shrinking it enough for withdrawal from the pipe. Bursting strength of this pipe is declared to be exceptional.

Future of Pipe

Another method of making pipe is used by Lincoln Industries, Inc., Marion, Va. Still another is used by Perrault Bros., Lami-Rock Div., Tulsa, Okla., a company with long standing in oil pipe-line equipment. In the Perrault system the pipe is formed centrifugally. At least one other company is entering the glass-reinforced polyester pipe field. All of them have foreseeable markets in the civilian oil transfer market, in chemical plant piping, and elsewhere. All of them will improve their methods and tube products because of the stringent requirements of the engineering and ordnance officials of the Armed Forces.

Big moldings (aside from boats) are another example of the payoff of peacetime development of economical methods coupled with the rigid specification targets of military applications. Probably the first big hand-made job of this kind was the cyclotron shell made by the Plastics Div., Chemical Dept., General Electric Co., at its Pittsfield, Mass., plant in 1947. Rates of cure on heavy sections, amounts and kinds of catalysts required, conditions of pressure were all furthered by this work.

Today several companies are making big moldings on a production basis. Zenith Plastics Co., Gardena, Calif., is a pioneer in the wet layup method of making big shapes, especially large airborne radomes. Controlled pre-impregnation of glass mat and cloth enabled the company to get away from spraying and pouring resin. Thus the technique of making big pieces was still further advanced, and now several companies make a business of pre-impregnating (or coating) fibrous glass material.

Possibly the biggest radomes ever made are currently on the line at Lincoln Industries, Inc.—one about 16 ft. and another 28 ft. in diameter.

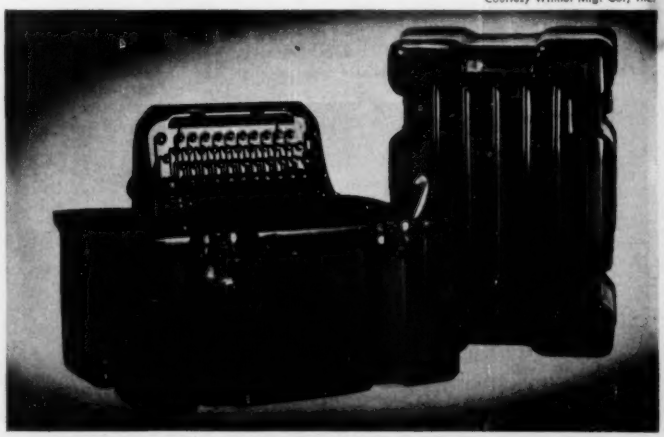
Shades of the writers who prophesied plastics houses! These big units are of sandwich construction, are structural entities, and are made with precision.

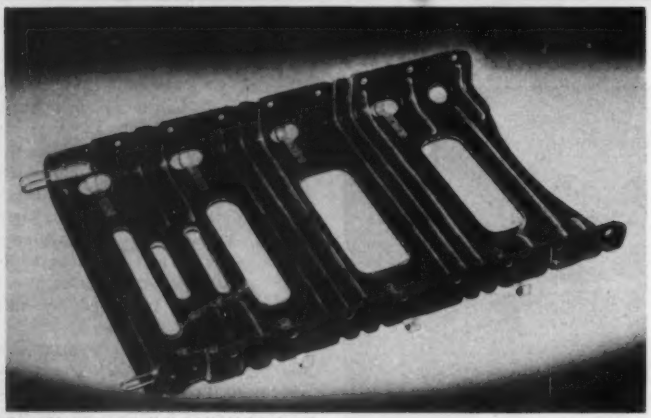
At Mount Vernon, N.Y., East Coast Aeronautics, Inc., is making a new type of military shelter out of Fiberglas mat and Laminac resin.

(*Continued on* p. 94)

Ribbed construction of typewriter case specially designed for the Army gives it extra strength. In mass production, case will be molded from preforms in metal-to-metal molds

Courtesy Winner Mfg. Co., Inc.





Photos this page courtesy Universal Moulded Products Corp.

Pack board molded for the Army Quartermaster Corps has corrugations molded-in to give the piece strength while permitting use of thin sections, thereby keeping the weight down

Shaped somewhat like an igloo, this shelter is now getting severe use tests by the Alaskan Air Command. The design is the result of the discovery that a perfect hemisphere can be constructed from 12 identical sections. Since each of the parts is the same, a complete shelter can be quickly assembled. Each section is equipped with attached quick-acting latches, so that no special tools are required and there is no danger of some vital part being lost in transit. With this monocoque design, no frames or internal supporting members are required.

Each panel is edged with a rubber extrusion to provide a weather seal. In shelters for use in the Arctic or tropics, the under side of each panel is insulated with airplane-quality glass wool, held in place and sealed against moisture by a vinyl-impregnated fabric. The high insulating property of the reinforced plastic minimizes the amount of additional insulation required, and the spherical shape reduces to a minimum the temperature differential from floor to ceiling.

The compactness and light weight of these shelters make them easily portable. Panels for a complete 20-ft. shelter can be packed in a crate 8 by 8 by 3 ft., and weigh about 1000 lb. insulated or 700 lb. bare. Complete shelter facilities for a fighter squadron of six planes can be carried in four 4-engine planes of the type used by the Air Force today. Included would be quarters for operations, administration, equipment, and personnel.

Each panel in the shelter is made by dry layup of tailored glass mat with rib reinforcement built into the layup and resin sprayed on. Cure is at room temperature.

One of the most important things that have happened to the reinforced plastics baby of World War II since 1945 was the development of preforming and of pressure molding in metal molds.

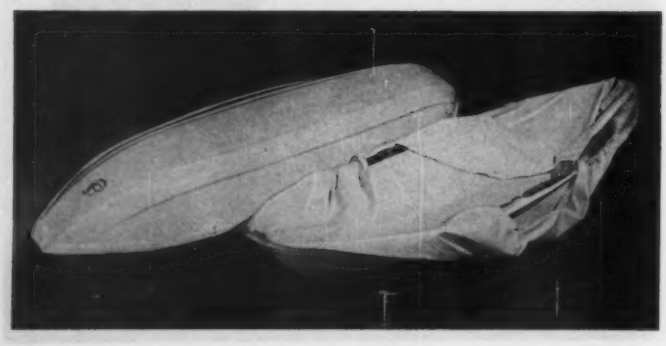
Preforming was an idea borrowed from the felt hat industry and was nurtured by Owens-Corning-Fiberglas Corp., Toledo, Ohio, and by Turner Machine Co., Inc., Danbury, Conn. The whole idea was to circumvent tailoring of mat and hand layup of relatively small pieces by blowing or sucking onto a perforated metal form a layer of chopped glass fiber strands with a binder resin to hold them together.

In its early days—only two years ago—preforming used equipment similar to the hat industry, and the chopped up reinforcement came in a bag. The metal preforming forms were crude in the extreme—just bent, punched metal. Now, each major plant has special design of preforming equipment directly suited to its purposes. Molded Resin Fiber Co., Ashtabula, Ohio, for example, has lights behind the preforms so that the operator may gage density.

Now, also, and thanks largely to work done on the biggest preform program to date by Apex Electrical Mfg. Co., Cleveland, Ohio, preform forms of punched metal are very accurate, shaped precisely on wooden male forms made from the blueprints of the part to be molded and welded and ground to high tolerances. It has been found that in mass production only an exact preform will give consistent molded pieces.

Now, instead of using bagged chopped mat, molders use compact continuous glass rovings, feeding them through a chopper attached to the preform machine in which they can control the length of the fiber to the needs of the job. This is the first step toward completely automatic preforming. Another step, pioneered by Apex and still not generally used, is the pressing fixture to hold preforms to shape while they are pre-baking. Pressing fixtures are used for concave curves in the preform. Apex coats its preform forms with Teflon resin for quick release after spraying.

Arctic sled molded of reinforced polyester was an early development job for Army Quartermaster Corps. The first models of the sled were delivered for service tests in 1948



Pressure and Heat

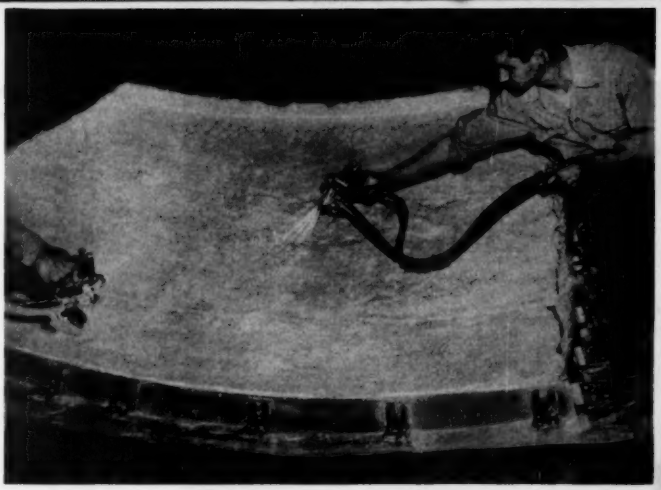
Zenith; Apex; Molded Resin Fibers; Auburn Button Works, Auburn, N.Y.; and Structurlite Plas-

tics Corp., Hebron, Ohio, were the companies first to use preforms in metal male and female molds to produce moldings in compression presses. Previously, metal females had been used with rubber force plugs to mold tailored mat. With metal-to-metal molding came pressure on the resin by virtue of tapered cut-off rings on the molds—and nearly everybody was surprised to discover that the resin was capable of withstanding both pressure and heat!

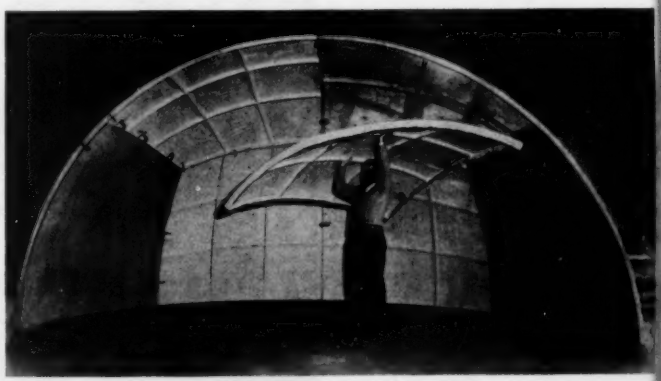
With compression molding of preformed material came complicated shapes (such as the Apex automatic washing machine parts—see page 93, April, 1950, MODERN PLASTICS) deep draws and compound curves (such as in the Eames chair molded by Zenith—see page 67, August, 1950, MODERN PLASTICS)—and unbelievably fast production. This was what put glass-reinforced plastics in all-out competition with metals for mass market items.

And this compression molding of preformed materials is to serve mobilization well—especially in the manufacture of boxes, carrying cases, helmets, small radomes, housings, and even personal equipment for servicemen.

The third article in this series, to appear next month, will feature electrical grades of reinforced plastics, the principle of metal reinforcement, the problems of thick sections, inserts for special purposes, the formed sheet and newer flat sheet materials, and case histories of assembly.—The Editor

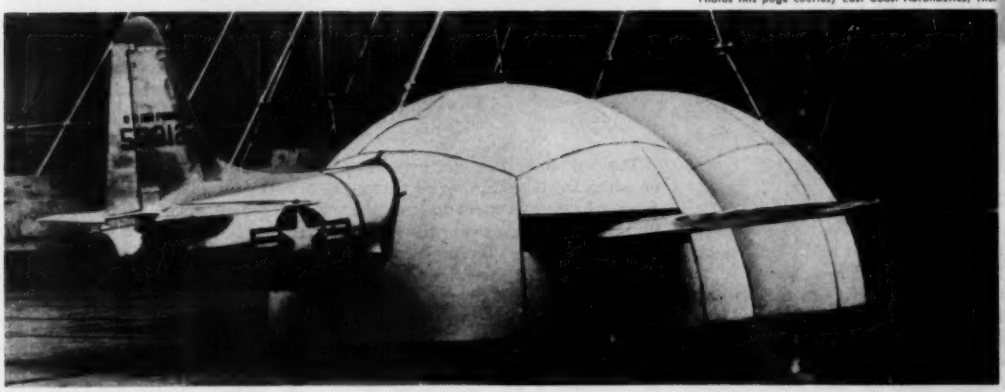


One of 12 identical panels which make up a 20-ft. igloo-like plane shelter is sprayed with resin after dry lay-up of tailored glass mat. Reinforcing ribs are molded-in



Shelter can be quickly assembled. Each section has quick-acting latches attached, and no special tools are required. Joints are tight because each panel is edged with rubber

Photos this page courtesy East Coast Aeronautics, Inc.



Panels for a complete 20-ft. shelter can be packed in a crate 8 by 8 by 3 ft., and weigh about 1000 lb. insulated or 700 lb. bare. Double shelter shown has openings to allow tail and wings of plane to stick out, has plenty of room for mechanics to move inside

Phenolic and

Cover for aerial camera magazine, molded of glass fiber-reinforced polyester resin, offers insulation needed to keep film at proper temperature

Photos this page courtesy U.S.A.F. Air Materiel Command

Polyester-glass mat magazine cover can take rough handling without denting or breaking, is lighter than steel top it replaced. Gasket in underlid keeps out light

MORE than 24 molded phenolic parts and one large Fiberglas reinforced polyester piece are being used to reduce the weight and improve the performance of the A8B Aerial Camera Magazine made by Ryan Industries, Inc., Detroit, Mich., for Air Materiel Command.

The A8B magazine fits on the K38 Aerial Reconnaisance Camera and automatically transports the film so that it is at a standstill when each picture is taken. The camera takes pictures at a rate of one every 1.2 sec., and it is the first still camera to make use of the Geneva motion used to produce intermittent motion of the film in movie cameras.

When Ryan Industries began to design the A8B, it set up a number of objectives: 1) faster, more efficient, more trouble-free operation; 2) reduced weight; 3) reduced size; 4) less noise. All of these objectives were attained—and plastics contributed to their attainment.

Reinforced Polyester Cover

The cover for the A8B magazine is 22 in. long, 14 in. wide, and 5½ in. high at the highest point. It is molded for Ryan Industries by Laminated Plastics, Inc., Cleveland, Ohio, from Glastic, a Laminac resin reinforced with Fiberglas mat. The main reasons for the choice of this material were its insulation value and its light weight.

The bottom of the film magazine on which the Glastic cover rests contains a heating element to keep the film from becoming too brittle at the low temperatures encountered at high altitudes. The temperature surrounding the camera may go as low as −65° F., and the film should not be used at temperatures lower than −5° F. Thus the cover must be able to maintain a 60° differential between the inside and the outside of the magazine. The reinforced polyester cover was much better suited to perform this function than the sheet steel cover used on earlier magazines.

To make the film magazine heat-tight and light-tight, the underlid has a grooved surface in which a narrow strip of rubber is placed. The cover is tightened into the rubber-filled groove with a hand screw.

In weight, always an important factor in airplanes, the Glastic magazine cover effected a saving of al-

Polyester in Aerial Camera

Reduced weight and size and faster, more efficient, and quieter operation were achieved by using plastics for cover and more than two dozen internal parts of camera magazine

most 4 pounds. The old metal covers weighed 5.75 lb.; the polyester Fiberglas cover weighs only 1.85 pounds.

The resiliency and impact resistance of the plastic cover are also important advantages. It can take rough handling without damage.

Molded Phenolic Parts

After considering various other materials, Ryan Industries chose Durez phenolic for more than 24 internal parts of the magazine. The phenolic parts of the magazine mechanism are produced for Ryan Industries by Molded Products Co., Hazel Park, Mich. Among the items being molded are: spool valve, cam gear, cam spacer, clutch spider, compound idler gear, metering spool gear, clutch disk retainer, and brake housing.

The use of phenolic for these internal parts resulted in a weight saving of about 4 pounds. This, together with the saving effected in the cover, makes a total saving by the use of plastics of about 8 lb. over the original magazine.

The noise of the operating mechanism was also reduced through the use of phenolic parts, and the noise level was further reduced by the sound-deadening effect of the plastic cover.

Many of the phenolic parts had to function properly with parts made of metal over a wide temperature range. The rate of contraction and expansion of the materials thus had to be closely similar, so that the parts would not bind at high temperatures or be too free at extremely low temperatures.

For one of the gear mechanisms in which two materials are used, an aluminum alloy with a thermal expansion rate of 0.0011 and a phenolic material with a rate of 0.0019 were selected. Other phenolics with slightly lower rates were available, but an impact-type material had to be used because of the strength requirements for the part.

For some of the phenolic parts, it was considered desirable to use a self-lubricating type of material. These parts were molded of a Durez material with a small percentage of graphite added to the phenolic. This obviated the need for lubrication of the major operating mechanism and thus, according to the manufacturer, resulted in "a unit which is as free from servicing problems as any mechanism of this type can be."

The excellent operating characteristics obtained with the phenolic parts warranted an increase in speed. The greater stresses resulting from the higher speed could be imposed on the phenolic parts without causing undue deformation. Neither the stresses nor the temperature changes affected the operating tolerances of the parts.

Photos this page courtesy Durez Plastics & Chemicals, Inc.

More than 24 internal parts of the magazine were molded of phenolic, permitting additional saving in weight. Compound for some parts contained graphite for self-lubrication

Magazine mechanism, showing how phenolic and metal parts operate together. This requires close matching of thermo-expansion rate of molding compound and metal

Left—Professional lettering can be produced in a fraction of the usual time with the Varigraph, which has a housing and knobs molded of Tenite II cellulose acetate butyrate. The 7- by 7-in. printing device slides along a straight-edge tacked to the drawing board. Pen point is operated by moving stylus along template. Control knobs govern the height and width of the letters. Variegated green housing and ivory knobs are molded by Evans-Zeier Plastic Co., Route 1, Madison, Wis. The instrument is manufactured by The Varigraph Co., Inc., Madison 1, Wis.

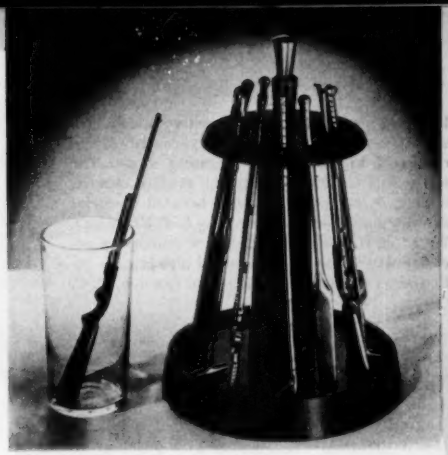
Left—Attractive, rugged 3-min. timer consists of a glass timer embedded in a block of acrylic. The transparent curved face of the acrylic block magnifies the timer against the opaque background and makes it easier to read. The whole unit is only 3½ by ¾ by ⅝ in. and is weighted at the ends for better stability. It is made by Time It Corp., Stony Brook, L. I., N. Y.

PLASTICS

Right—Compact golf ball washer which weighs only 4 oz. consists of two styrene halves with sponges glued in them. To clean a ball, the sponges are moistened with cleaning solution and the two halves are brought together over the ball and rotated. Washer is manufactured by Handicraft Mfg. & Chemicals Co., 872 Riverbank Street, Lincoln Park, Mich.

Left—Caps molded of polyethylene fit on telescopic gun sights and protect the valuable sight from weather, dust, bumps, and scratches. Interchangeable Lucite acrylic lenses help filter out haze. Each set comes with clear lens for normal shooting, yellow for dark days, green for bright days. Made by Hydropack, 5717 So. Hoover Street, Los Angeles 37, Calif., to fit standard sizes of scopes

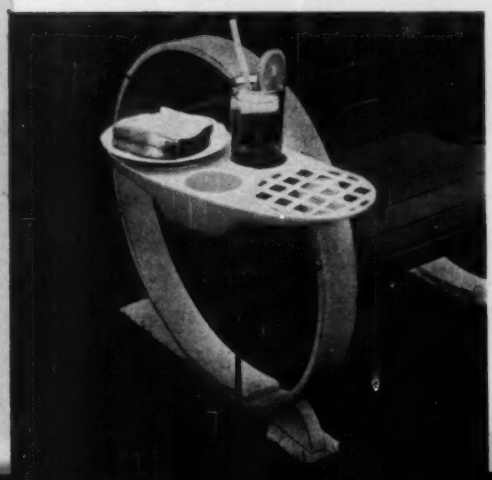
Below—Gage for domestic oil burner tanks operates by direct mechanical action. Transparent double domes are molded of Tenite II cellulose acetate butyrate, and indicator rod is capped with red butyrate disk. Nut molded of butyrate holds the unit in place. Made by Krueger Sentry Gauge Co., Green Bay, Wis.



Above—Drink stirrers 7½ in. long are molded of styrene in the shape of a golf club, canoe paddle, polo mallet, fishing rod, and riding quirt. The stirrers, known as Sport Stirs, are gold plated and are sold in sets in hand finished solid walnut racks. Sport Stirs, styled by George Miller, Chicago designer, are manufactured by Nu-Pro Corp., Chicago 20, Ill.

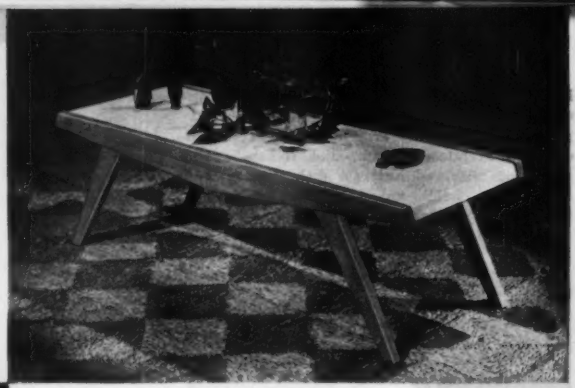
PRODUCTS

Right—Handbags shaped like miniature hat boxes are fabricated of 15-gage vinyl. The bags are lined with rayon and stiffened with cardboard. Seams are electronically sealed in a pattern which resembles stitching. The bags, called Bon Bon Bags, are 5 in. in diameter and 4 in. high, and have mirrors in the lids. Made by Fiss Bros., Inc., 28 W. Houston St., New York, N. Y.



Left—Serving tray molded of Lustrex styrene has detachable metal post which can be pressed down into the ground to serve as a support. The tray holds tumblers, bottles, and dishes for easy outdoor serving. Plastic part of the Lawn Servet is molded by Rockford Molded Products Co., 2230 Kishwaukee Ave., Rockford, Ill., for Commercial Wire Products Co., 1827 Broadway, Rockford, Ill.

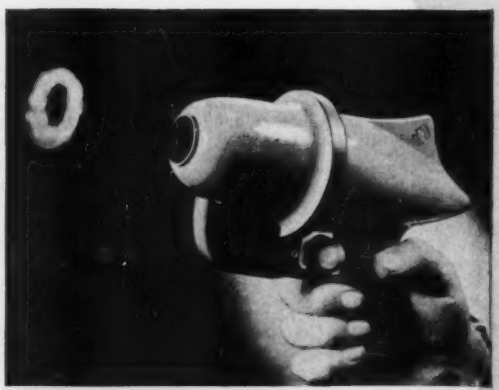
Right—Coffee table has attractive alcohol-resistant top surfaced with vinyl-coated fabric embossed to resemble Madagascar straw. The top resists scuffing and can be readily cleaned with a damp cloth. The vinyl-coated material is made with Geon paste resin by L. E. Carpenter, Wharton, N. J. The line of almon mahogany occasional tables with vinyl-coated tops is made by Founders Furniture Co., Pleasant Garden, N. C.



Left—Kodaslide Table Viewer for 35 mm. and Bantam color transparencies combines projector and screen in a single unit. Mottled mahogany housing for the unit is molded of G-E phenolic in two sections and bonded together with special adhesive. Inner optical system of the viewer slips into the housing from the bottom. The housing is molded by the Plastics Div., General Electric Co., Pittsfield, Mass. The viewer is made by Eastman Kodak Co., Rochester, N. Y.

PLASTICS

Right—Smoke Ring Gun, molded of gray Tenite I cellulose acetate emits perfect smoke ring each time the trigger is pulled. Smoke pellets and striker strips are replaceable. Smoke is non-toxic and there is no danger of fire. Gun is molded by South Gate Tool & Engineering Co., South Gate, Calif., for Nu-Age Products, Inc., 232 S. Beverly Dr., Beverly Hills, Calif.



Left—Fishing creel made of Lumite woven saran fabric provides proper ventilation to keep fish in good condition, does not absorb odors, and can be turned inside out for cleaning. The flexible creel molds to the body and stays out of the way, can be folded for compact storage. Creel is made by Anglers Products Co., 93-06 Corona Ave., Elmhurst, N. Y.

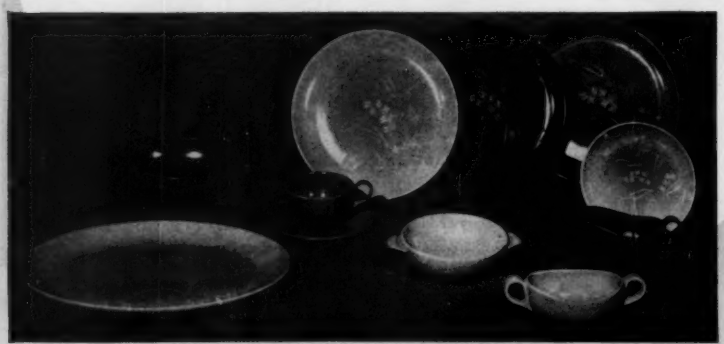
Right—Crash helmet for soap box derby drivers is made in one piece of shatterproof Lumarith cellulose acetate. The helmet, which bears the stamp of approval of racing driver Wilbur Shaw, has cloth interlinings, felt chin and earpads, and foam rubber head band. The helmet is molded by Columbus Molded Plastics Corp., 1703 Keller Ave., Columbus, Ind., and is distributed by Indianapolis Safety Products Co., P. O. Box 354, Indianapolis, Ind.

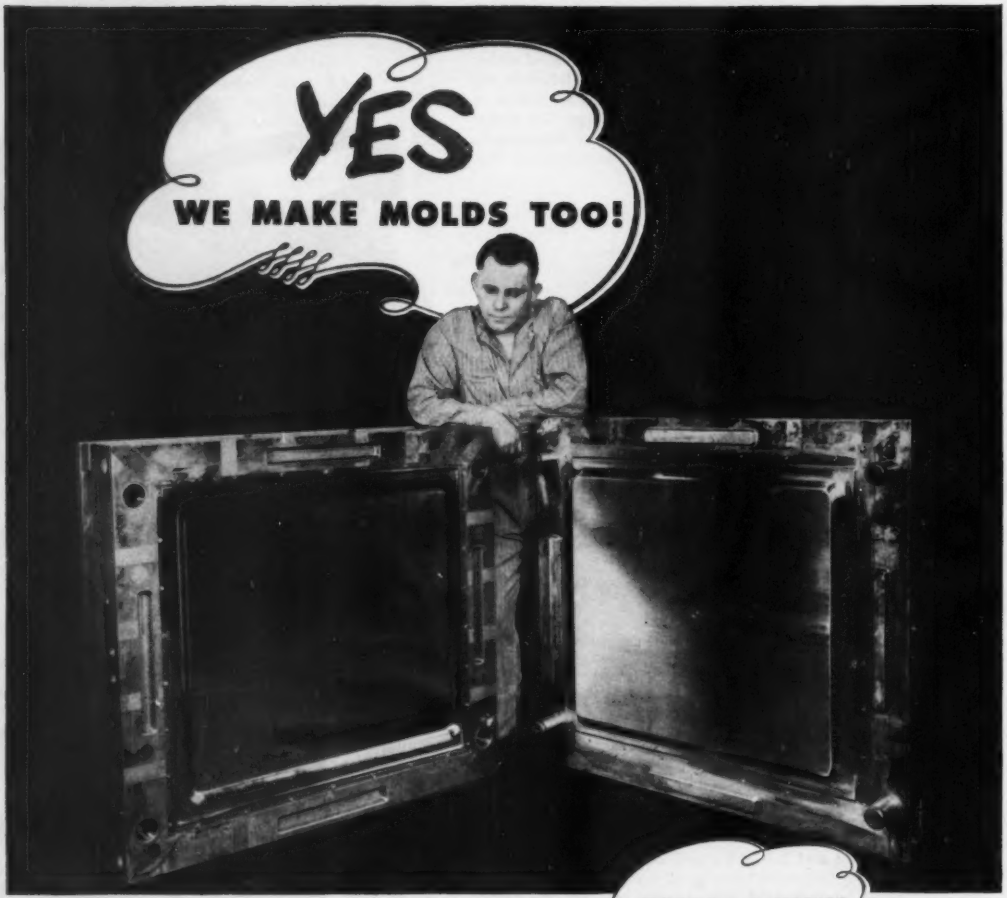
Left—Valetray, molded of Lustrex styrene, attaches to the inside of a man's closet door and provides a convenient storage place for the contents of his pockets. The tray has molded-in compartments for a wallet, cigarettes, matches, keys, change, etc. Valetray is made by C. B. Cotton & Co., Inc., 114 Forrest St., Brooklyn 6, N. Y.

PRODUCTS

Right—Lighter and ashtray are combined in a single unit in the Tra-Lighter. The 4¾ in. diameter tray is molded of Bakelite phenolic and has sides and bottom molded of transparent Lucite acrylic decorated with gold on the inside surface. The lighter holds enough fluid to last eight months. Tra-Lighter is made by Authentic Miniatures, Inc., 59 E. Van Buren St., Chicago, Ill.

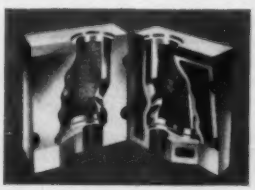
Below—Desert Flower tableware is the first melamine tableware available with a molded-in design. The floral pattern is debossed only about 0.003 in. and will not catch food particles. The dishes, available in four colors, can be ordered in sets or from open stock. Desert Flower tableware is molded of Melmac material by International Molded Plastics, Inc., 4387 W. 35th St., Cleveland 9, Ohio





HOBBED CAVITIES
by MIDLAND

One of our good Hobbed Cavity customers recently astounded us by saying he didn't know we made *molds* too. The truth of the matter is—if we didn't know a great deal about mold-making we could never have become the country's outstanding producer of hobbed cavities. Just to prove that molds are a big item with us, look at the big item shown above; a refrigerator door mold—designed and produced by Midland. Whether you need molds or hobbed cavities, large or small, it will pay you to specify Midland—where know-how puts quality first. Send your prints, without obligation of course.



MIDLAND DIE AND ENGRAVING COMPANY

1800 W. BERENICE AVE. • CHICAGO 13, ILL.

D&E

Makers of Plastic Molds • Die Cast Molds • Engraved Dies • Steel Stamps • Hobbings • Pantograph Engraving

Fabricating Reinforced Plastics†

Details of production techniques, with specific information on equipment and tooling for a variety of jobs

by ROGER B. WHITE††

BECAUSE glass is a hand and abrasive material, there is a widespread assumption in the industry that glass reinforced plastics are impractical to machine. Such assumptions, and a lack of information on the machining characteristics of these materials, have been an obstacle to their expanded use—an obstacle which is rapidly being overcome. In fact, new applications in many fields are today being developed at an unprecedented rate.

While it is true that some glass reinforced laminates—glass cloth melamine, for example—do require specialized machining techniques, glass mat reinforced polyesters do not. Experience has shown that the glass mat reinforced polyesters are roughly comparable in machining characteristics with canvas base phenolic.

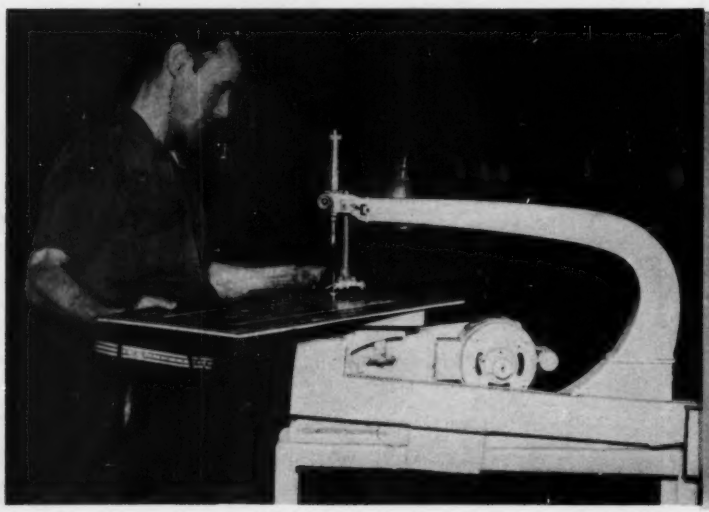
It is entirely possible to fabricate polyester Fiberglas laminates by conventional techniques and with standard equipment. As a result of a growing realization of the truth of this statement, many high production items are today being made from these materials under circumstances where unreliable or excessively costly operations could not be tolerated.

Through a study of some of the production work currently being done with reinforced polyesters, it is possible for the designer and engineer to become familiar with the range of operation which can be contemplated with confidence, and thus become able to specify these materials where they will serve to advantage.

The accompanying photographs and production details serve to indicate the possible scope of rein-

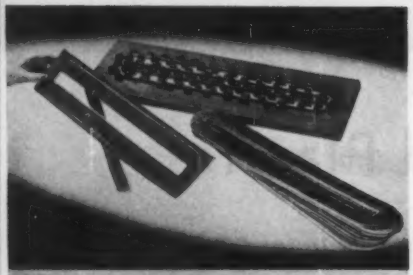
* Reg. U. S. Pat. Office.
† From a paper presented at the Sixth Annual Technical Session and Exhibit of the S.P.I. Reinforced Plastics Division.
†† President, Laminated Plastics, Inc., Cleveland, Ohio.

JIG SAW CUTTING



Part:	Large field coil washer
For:	Reliance Elec. heavy duty motor
By:	Reliance Elec. (mat'l. by Laminated Plastics, Inc.)
Size:	3/16 by 12 by 24 in.
Holes:	One large rectangular
Rate:	5 to 10 pcs./hr., feed 5 ft./min.
Lot:	50 to 100
To date:	2000 (various large sizes)
Tool:	Standard metal saw blade ⅛ in. wide
Life:	One piece, 3 lineal ft.
Finish:	Good edges, no fuzzing, usable as is
Lubrication:	Dry

RULE DIE BLANKING



Part:	**Field coil pole washer**
For:	**Reliance Electric heavy duty motor**
By:	**Die-Cut Prod. Co. (mat'l. by Laminated Plastics, Inc.)**
Size:	**1/32 by 3½ by 20.**
Holes:	**One large rectangular**
Rate:	**20 strokes/min., 500 pcs/hr.**
Lot:	**500 to 1000 pcs.**
To date:	**5000 pcs.**
Machine:	**Precision platen toggle press, custom design**
Tool:	**High speed steel rule die against hard die steel plate**
Life:	**Anticipate 20,000 per sharpen**
Stripping:	**Normal**
Finish:	**Slight roughness, some crushing of edges**
Lubrication:	**Dry**
Accuracy:	**Plus or minus 0.015 in.**

forced polyester applications. It should be particularly noted that the tooling and speeds used in these various operations do not differ materially from those already in use on other machinable materials.

In general, the following details apply to machining and fabricating Fiberglas reinforced polyesters:

Blanking and Shearing

1) Press capacity required is about half that for the same operation in metal; about the same as for phenolic laminates.

2) Sharp edges can be obtained on stock up to 3/32 in., fair up to 5/32 in., acceptable to 1/4 in.

3) Die clearances should be half those specified for steel. Shear gibs should be snug and blades sharp; about the same as for phenolics.

4) Heated stock is neither required nor desirable.

5) Punched holes will be smaller than the punch by 0.002 to 0.010 in., depending on thickness and diameter. Blanked pieces will be larger than the die by 0.001 to 0.005 inch.

6) Stripping mechanisms will require two to three times the loading used for steel blanking dies in order to overcome tendency of the reinforced plastics to grip the extended punches.

7) Die life between sharpenings will be about half that for steel and three-quarters that for phenolics.

Table I—Approximate Tool Sharpening Requirements

	Milling-routing-turning Lineal ft. of work per sharpen			*Blanking Pieces per sharpen*
	High-speed cutter	Carbide cutter	Diamond cutter	High carbon chrome nickel dies
Vulcanized fiber	5000 to 10,000	15,000 to 30,000	———	25M - 250M
Phenolic laminate	1000 to 2000	6000 to 10,000	———	15M - 150M
Glass mat polyester	300 to 500	3000 to 6000	30,000 to 40,000	10M - 100M
Glass cloth melamine	———	50 to 200	10,000 to 15,000	3M - 50M

Drilling and Tapping

1) Rapid operation, with much less power than for metals, can be accomplished easily.

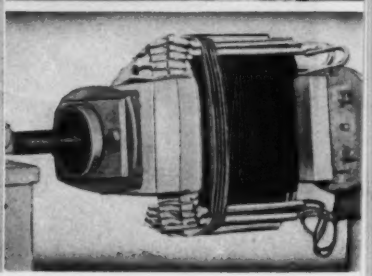
2) Smooth holes free from chipping and with strong threads (one-third the strength of steel) can be obtained.

3) Holes will tend to be larger than the drill by about 0.003 to 0.005 in. (more if not well guided).

4) Drill and tap wear will be quite rapid on first few pieces, then

ABRASIVE WHEEL SAWING

Part:	**Spacer sticks**
For:	**Kuhlman high volt. transformer**
By:	**Laminated Plastics, Inc.**
Size:	**⅜ by ½ by 36 in.**
Rate:	**500 lineal ft./hr., feed 15 ft./min.**
Lot:	**10,000 lineal ft.**
Quan. to date:	**300,000 ft.**
Machine:	**DeWalt Model G.E. table saw, 7½ hp, 3600 rpm.**
Tool:	**Carborundum wheel #RC30Q-B3RS, ⅛ in. thick**
Life:	**10,000 ft./wheel**
Lubrication:	**Water on blade**
Tolerance:	**0.015 in. on width**
Note:	**Proper precautions must be taken against flying fragments if wheel shatters**



BAND SAWING

Part:	**Railway coach seat end**
For:	**Coach & Car Equipment Co.**
By:	**Laminated Plastics. Inc.**
Size:	**3/32 by 14 by 20 in.**
Operation:	**Saw curved edges (two sides at once)**
Rate:	**60 pcs./hr., feed 10 ft./min. (double cut)**
Lot:	**500**
To date:	**10,000**
Machine:	**Delta 14-in. band saw, 200 ft./min.**
Blade:	**14-tooth, ½-in. wide, wavy set metal cutting**
Life:	**60 pcs./blade**
Finish:	**Fuzzy—requires filing and sanding**
Lubrication:	**Dry—requires vacuum collector**

it will tend to become stabilized.

5) Carbide-tipped drills should be used in solid fixtures for production drilling.

6) Tapping must be done carefully to avoid false cutting and severe weakening of threads. Automatic feed is essential on production work.

7) Wet operation will greatly prolong tool life and eliminate dust.

8) Vacuum dust removal is essential for dry operations on production scale.

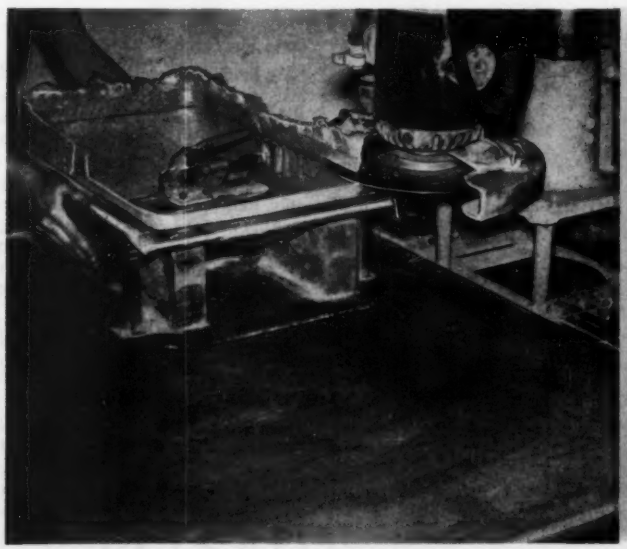
9) Drilling parallel to laminations must be done cautiously to avoid delamination just as with phenolic laminates. Drill should be kept sharp and feed should not be forced. Faster drilling can be accomplished when it is possible to clamp opposite faces tightly.

Rotary Cutting

1) Clean, smooth edges are easily obtainable at high speeds.

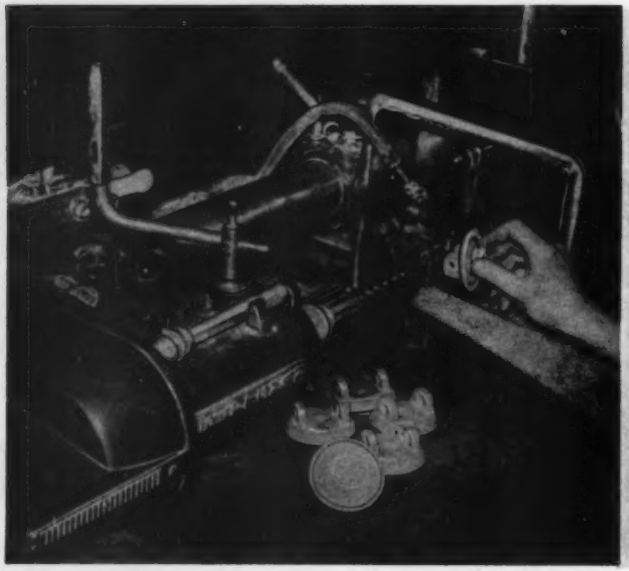
2) Wet cutting is far superior to

ROTARY BLADE SAWING



Part:	**Film magazine cover**
For:	**Ryan Industries Aircraft Camera**
By:	**Laminated Plastics, Inc.**
Size:	**1/16 by 14 by 22 in.**
Operation:	**Trimming flash edge**
Rate:	**30 pcs./hr., feed 20 ft./min.**
Lot:	**100 pcs.**
To date:	**2000 pcs.**
Machine:	**DeWalt model GP table saw, 2 hp., 3600 rpm.**
Tool:	**Di Met Rimlock 12-in. dia. steel blade, 3/32 in. thick**
Life:	**Anticipate 3000 pcs. (18,000 lineal ft.)**
Lubrication:	**Water**
Accuracy:	**Plus or minus 1/32 in.**
Finish:	**Smooth edge without fuzz or delamination**

JIG DRILLING



Part:	Tramrail bus bar insulator
For:	Cleveland Crane & Engineering Co.
By:	Laminated Plastics, Inc.
Size:	¼ by 2 in.
Holes:	Two—21/64 in. dia.
Rate:	500 pcs./hr. (1000 holes)
Lot:	10,000
To date:	200,000
Machine:	Craftsman 14-in. bench drill
Tool:	Super Tool Co. fast spiral carbide drill
Life:	500 pcs./sharpen, total life 5000 pcs. for required tolerance limits
Lubrication:	Water
Accuracy:	Size Q drill (0.332) makes 0.333 holes after first 5 holes then wears to 0.323 after 5000 pcs.

dry. Greater speeds are possible, less power is required, and the dust removal problem is eliminated.

3) Abrasive wheel cutting is faster than diamond or carbide blade cutting, and the cost of blade maintenance is appreciably lower.

4) Rigid work support and wheel mounting are essential when using an abrasive wheel to avoid hazardous and expensive blade breakage. Adequate safety hood must be provided.

5) Diamond-edged stainless steel blade is best where the conditions necessary for abrasive wheel cutting cannot be met.

6) Carbide-tipped saws will work satisfactorily where dry cutting must be done.

7) Sawing speeds are equivalent to those for phenolic laminates; much higher than for metal.

8) Carbide dry cutting blade life will be about one-half that with phenolics.

9) Blade maintenance cost with abrasive wheel cutting is insignificant.

SANDING (FLASH REMOVAL)

Part:	Tramrail bus bar insulator
For:	Cleveland Crane & Engineering Co.
By:	Laminated Plastics, Inc.
Size:	¼ by 2 in.
Rate:	400/hr.
Lot:	10,000
To date:	200,000
Machine:	Mead burring sander
Tool:	Carborundum No-Lap belt, 80 grit silicon carbide
Life:	2000 pcs./belt
Lubrication:	Dry

Band Saw Cutting

1) Smooth, accurate edges and fast cutting can be obtained at super-high blade speeds (5000 to 10,000 ft./min.) in equipment such as Do-ALL Zephyr.

2) Satisfactory edges requiring only light benching operations can be obtained at ordinary saw speeds.

3) Extra low blade speeds (300 to 400 ft./min.) are recommended for longer blade life with standard machines.

4) Standard coarse tooth metal cutting blades are satisfactory. Wavy or raker tooth types are recommended.

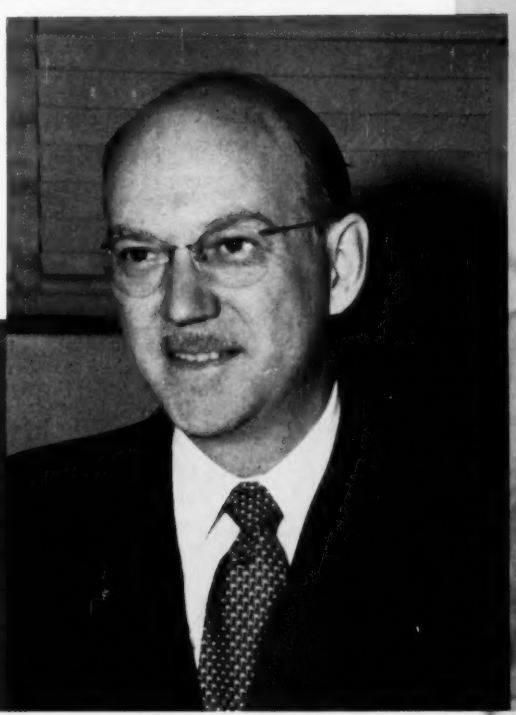
5) Blade teeth will lose initial keen edge in first few inches of cut to a degree where the saw is no longer useful for metal cutting but will continue satisfactory for glass

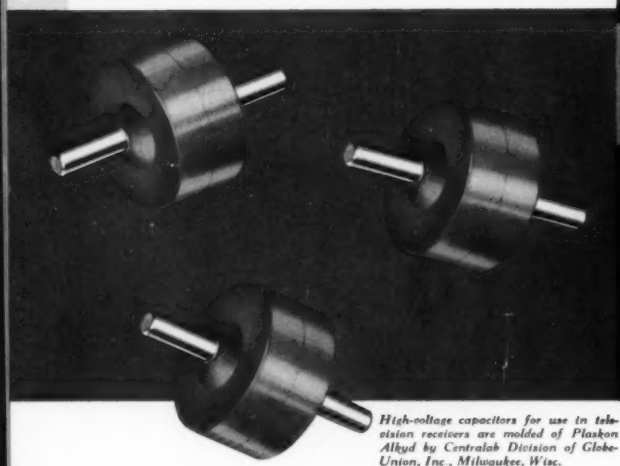
(*Continued on p.* 111)

"PLASKON ALKYD

has at least doubled the productive capacity of our molding equipment"

says Mr. W. S. Parsons,
Vice-President
CENTRALAB DIVISION OF GLOBE-UNION, INC.





High-voltage capacitors for use in television receivers are molded of Plaskon Alkyd by Centralab Division of Globe-Union, Inc., Milwaukee, Wisc.

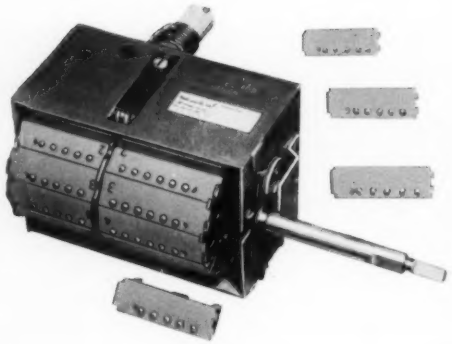
Like so many manufacturers, Centralab Division of Globe-Union, Inc., received substantial rewards in a hurry from a simple switch to Plaskon Alkyd Molding Compounds. And probably the most important of these was an increase in the productive capacity of molding equipment amounting to at least 100%. Mr. W. S. Parsons, Centralab vice-president, also reports "life of molding dies has increased" . . . "a very appreciable labor saving."

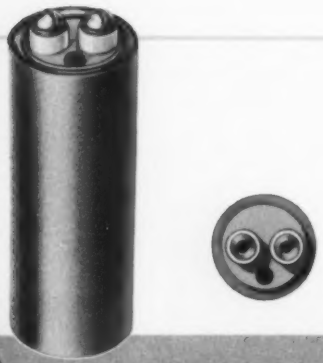
now turn the page for ----------

PLASKON®
ALKYD

PLASKON DIVISION • LIBBEY • OWENS • FORD GLASS COMPANY
Toledo 6, Ohio
In Canada: Canadian Industries, Ltd., Montreal, P.Q.
Branch Offices: Boston, Chicago, New York, Los Angeles, Rochester
Manufacturers of Molding Compounds, Resin Glues, Coating Resins

16 PRECISION PARTS EVERY 30 SECONDS! Here is an outstanding example of the high-speed production possible through the use of quick-curing Plaskon Alkyd. And these parts used in television tuners must be held to precision tolerances as close as .0005". Molded for Standard Coil Products Co., Chicago, by Wilcox Plastics, Los Angeles; Mayfair Molded Products Co., Chicago; and Trans-Matic Plastics Co., Chicago.

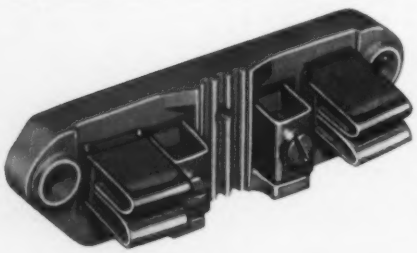




HIGH-SPEED MOLDING YIELDS BIG SAVINGS! Sangamo Electric Company, Springfield, Ill., achieved a new high-production molding record turning out Plaskon Alkyd parts for its motor starting capacitors on a battery of 13 small presses. Sangamo has reported: "This speed really shows up where it counts most — in savings!"

more evidence of increased production with PLASKON ALKYD

FASTER PRODUCTION CONTRIBUTES TO 50% COST SAVING! Barber-Colman Company, Rockford, Ill., realized a saving of 50% in unit cost when it switched to Plaskon Alkyd for molding parts for rotors used in J. I. Case tractors. And the higher production rate achieved with Plaskon Alkyd was an important contributing factor!



HIGH PRODUCTION RATE ON AUTOMATIC PRESSES! Molding its watt-hour meter bases with Plaskon Alkyd, Blakeman Bros. Electric Mfg. Co., Los Angeles, cites the following results: "We have found that Plaskon Alkyd lends itself very well to automatic molding, giving us a high production rate on automatic presses."

WOULD

300 to 400%
faster molding of parts

IMPROVE YOUR PROFIT PICTURE!

From a wide variety of applications comes mounting evidence that Plaskon Alkyd can be molded *three to four times faster* than conventional thermosetting molding materials with appropriate modification of molding equipment. Molder or manufacturer . . . if you have any small parts which lend themselves to compression molding, here could be the way to step up their production tremendously!

And the amazing, quick-curing plastic which has created new concepts of speed in compression molding helps in other ways to improve profit figures. It can be molded on high-speed automatic machines, saving labor. It can be molded at lower pressures with simpler dies. And it can improve the general efficiency of molding room operation because it is less sensitive to variations in pressure, temperature and time.

Thanks to its remarkable properties, particularly its electrical properties, Plaskon Alkyd can be successfully used in parts which it was never before practical to make of plastics. And it can improve the performance of many parts now made of conventional thermosetting materials!

Investigate Plaskon Alkyd more completely—*now.*

mold it better and faster with

PLASKON®
ALKYD

PLASKON DIVISION • LIBBEY • OWENS • FORD GLASS CO.
Toledo 6, Ohio
In Canada: Canadian Industries, Ltd., Montreal, P. Q.
Branch Offices: Boston, Chicago, New York, Los Angeles, Rochester
Manufacturers of Molding Compounds, Resin Glues, Coating Resins

TURN THE PAGE FOR NEWS OF ANOTHER PLASKON MOLDING COMPOUND ➔

We believe that advertising Plaskon Molding Compounds when they're in short supply can help build future sales for you, too...

Advertising is not a faucet which can be turned on and off at will without losing effect. So it is our intention to continue to advertise the advantages of Plaskon Molding Compounds throughout the period of short supply. It is our sincere belief that the kind of advertising we are doing will not only maintain the widespread acceptance of Plaskon urea and melamine, but interest people who may mean business to you, as the molder, and ourselves, as the supplier, in days to come.

Meanwhile, as the demand exceeds our ability to produce, we are exploring every means which might help to increase our daily output of Plaskon urea and melamine molding compounds. The needs of our molder customers will be filled to the best of our ability. And we do not intend to curtail our special services which molders have come to depend upon.

PLASKON®
MOLDED COLOR

PLASKON DIVISION • LIBBEY • OWENS • FORD GLASS CO.
Toledo 6, Ohio

In Canada: Canadian Industries, Ltd., Montreal, P. Q.
Branch Offices: Boston, Chicago, Los Angeles, New York, Rochester
Manufacturers of Molding Compounds, Resin Glues, Coating Resins

BLANKING

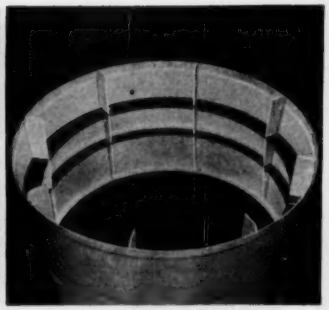
Part:	Washing machine balance ring baffles
For:	Apex Montgomery Ward automatic
By:	Apex Electric Co.
Size:	3/32 by 2 by 12 in.
Holes:	Three 1/3 in., plus notches
Rate:	600 pcs./hr., stroking rate 45/min.
Lot:	20,000
To date:	200,000
Machine:	Bliss 50-ton punch press
Tool:	Compound die, quality tool steel
Life:	100,000 pcs./sharpen
Stripping:	Three times normal pressure; positive piece ejection
Clearances:	0.03 in. by thickness, up to ⅛ in. (⅙ usual for steel)
Finish:	Very clean sharp edges, no chipping or cracking
Lubrication:	Dry
Accuracy:	Tight accurate fit required for cementing

MILLING

Part:	Washing machine balance ring baffles
For:	Apex Montgomery Ward automatic washer
By:	Apex Electric Co.
Size:	3/32 by 2 by 12 in.
Grooves:	Two ⅛ in. wide by 1/32 in. deep
Rate:	23 in./min. feed, 170 ft./min. cutter speed, 150 pcs./hr.
Lot:	5000
To date:	200,000
Machine:	Cincinnati #2 milling machine
Tool:	High speed steel
Life:	2500 pcs., 400 lineal ft./sharpen
Accuracy:	Thickness held to 0.005 in. tolerance
Lubrication:	Dry (vacuum dust removal)

FLY CUTTING

Part:	Washing machine balance ring
For:	Apex Montgomery Ward automatic washer
By:	Apex Electric Co.
Size:	3/32 in. thick by 24 in. dia.
Rate:	50 rmp., 310 ft./min.; 35 pcs./hr.
Lot:	2000 pcs.
To date:	25,000 pcs.
Machine:	Van Norman miller
Tool:	Carboloy-faced lathe bit
Life:	500 pcs., 3000 lineal ft./sharpen
Finish:	Sharp and clean one edge, scrap some fuzz
Lubrication:	Dry
Accuracy:	0.010 in. on dia.
Note:	Assembled view shows baffles in place in balance ring



laminate cutting for an hour or more of operation on normal thicknesses.

6) Dust should be removed with vacuum pick-up where production operations are involved.

Milling and Lathe Operations

1) Clean, smooth, accurate surfaces can be obtained at high speeds.

2) Speeds and feeds recommended for brass will be found most satisfactory.

3) Tools must be kept sharp to avoid crowding pressure against cutter with resultant inaccuracies and tendency to delaminate where cutting edge rises across the laminations.

4) High clearance and negative rake should be used on cutting tools.

5) Carbide or diamond tools will give much better life than high speed steel tools.

Routing

1) For production edging, routing offers higher speeds and lower tool maintenance than any other machining process.

2) For medium run cutting of irregular holes, routing is much faster and more accurate than jig or keyhole sawing.

3) Properly set up for edging operations, routing will give clean and accurate surfaces.

4) Routing of large holes tends to leave a fuzzy edge requiring bench filing.

5) Routing has to be done dry and produces profuse quantities of dust which must be removed with vacuum dust collectors.

(*Continued on p. 114*)

All ways light and always right

Products made with

LAMINAC® Laminating Resins

Here's what LAMINAC Resins can put into products by way of special performance features:

STRENGTH AND LIGHT... Commercial signs made with LAMINAC Resins are so translucent that *one* electric bulb illuminates them brilliantly. Because of LAMINAC's superior strength, the seller fully guarantees them against breakage under normal use.

LIGHTNESS AND STRENGTH... Five times lighter than one made of iron, and 35,000 times as large as a baseball, the new Westinghouse photometer meets all requirements for strength, ease of handling and maintaining, ease and economy of production.

STAMINA AND LIGHTING... Street lamp reflectors shed light on the toughness and durability of LAMINAC Resins. They offer all kinds of resistance to all kinds of weather, corrosion, and small-boy mischief.

AMERICAN Cyanamid COMPANY
PLASTICS DEPARTMENT
32 ROCKEFELLER PLAZA, NEW YORK 20, N. Y.

In Canada: NORTH AMERICAN CYANAMID LIMITED, Royal Bank Building, Toronto, Ontario, Canada.

Cyanamid looks at

PLASTICS TODAY...

Newest chapter: Reinforced Plastics

FOR THE PAST DECADE the story of progress in plastics has been "stopping" industry.

Latest chapter . . . concerns polyester reinforcing resins, a comparatively new type of plastic. For very practical reasons, industry is taking a long interested look at polyesters.

They introduce dramatic opportunities for vastly broadened product usefulness . . . with significantly lowered manufacturing costs . . . and with increased sales and profits.

Evidence of reinforced polyesters' growth is a development within the plastics industry's own trade association structure. The Reinforced Plastics Division of the Society of the Plastics Industry has come along fast enough to hold its own separate national conferences. Concerned with a fast-moving field of new application and new-product development, discussions at its meetings focus sharply on practical progress with reinforced plastics . . . progress made possible by the successful use of polyester resins in an amazing divergency of end-products.

To illustrate:

Column to your left highlights several end-products and reasons why they are best made with LAMINAC® . . . Cyanamid's polyester reinforcing resin. These examples demonstrate a range of size and shape about as divergent as can be expected from *any* basic material. They range

> . . . from a veritable edifice of highly specialized industrial testing equipment (room-high, 35,000 times the size of a baseball . . . yet only one-fifth the weight of similar equipment made with iron); . . . to a hardworking commonplace product of totally different shape and comparatively small size; a street-light reflector that takes paint and punishment far more efficiently than other materials traditionally used.

Within the scope of size, shape, and use lies many another proven example of what can be done with resins such as Cyanamid's LAMINAC.

To cite just a few: Machinery housings and guards, structural panelling, aircraft parts (structural or electrical), boat hulls, helmets, radomes, trays, tote boxes, . . . all lighter than aluminum, yet, weight for weight, stronger than steel.

LAMINAC . . . developed by American Cyanamid Company . . . is clear, thermosetting, has a wide range of viscosity. It may be used for impregnating glass cloth, glass mat, paper or many other materials to produce such diverse products as listed above. In its cured form, LAMINAC has excellent insulation properties, high chemical and abrasion resistance and great strength. (And color all the way through is easily achieved with LAMINAC pastes that readily incorporate into the basic resin.)

Small wonder that the full range of LAMINAC resin end-uses has hardly begun to be explored. But more and more manufacturers are probing its possibilities.

So, if you are designing a new product or re-designing one you have been making, LAMINAC may well help you make it lighter, stronger and, perhaps, less expensively. Why not find out? Write to us . . . we're ready to help you. Ask for "The Story of LAMINAC."

Westinghouse watt-hour meter terminal block: MELMAC 1500, Molded by Hemco Plastics Div., Bryant Electric Company.
RCA Victor Television Tube Holder: MELMAC Plastic 1500, molded by the Mack Molding Company.
your product

when you deal with electricity . . .

HOW SAFE CAN YOUR PRODUCT BE?

to make it safer; make it with MELMAC® *plastics*

Electrical components molded of MELMAC have an outstanding record of industrial, home and military service. Here's why:

Exceptional arc-resistance and non-tracking properties minimize hazards from short-circuiting and fire.

High resistance to carbonizing under arcing, wet or dry; high dielectric strength at normal or elevated temperatures.

Excellent dimensional stability and resistance to cracking.

On their record, MELMAC plastics are "ready and able" to help make your product safer . . . for defense, for industry or for the home. Consult any experienced, well-equipped molder. We'll be glad to help you find one.

AMERICAN Cyanamid COMPANY
PLASTICS DEPARTMENT
32 ROCKEFELLER PLAZA, NEW YORK 20, N. Y.

In Canada: North American Cyanamid Limited, Royal Bank Building, Toronto, Ontario, Canada.

PUNCHING

Part:	**Washing machine basket**
For:	**Apex (Kirby) washer**
By:	**Apex Elec. Co.**
Size:	**¼ in. thick (taper to 1/16 in.) by 24 in. diameter**
Holes:	**One 2 in. dia. irregular shape, three ⅜ in. round**
Rate:	**125 pcs./hr., stroking 30/min.**
Lot:	**500 to 1000**
To date:	**30,000**
Machine:	**45 Ton Niagara (prefer 60 ton)**
Tool:	**Tool steel die**
Stripping:	**Twice normal for steel**
Clearances:	**0.003 in. on 2 in. dia.**
Finish:	**Rough but clean**
Lubrication:	**Dry**

CEMENTING AND ASSEMBLING

Part:	**Washing machine basket**
For:	**Apex (Kirby) automatic**
By:	**Apex Elec. Co.**
Size:	**¼ in. thick (taper to 1/16 in.) by 24 in. diameter**
Bond Area:	**200 sq. in./pc.**
Rate:	**25 pcs./hr.**
Lot:	**500**
To date:	**30,000**
Preparation:	**Sand blast bond areas**
Adhesive:	**Laminac 4128, with Asbestine**
Gun:	**Pyles Industries type FG10D@ 60 p.s.i. air**
Tank:	**De Vilbiss 30 gal. pressure mixing**
Cleaning:	**Tank and gun daily with toluol**
Cure:	**30 min. @ 250° F. in air oven**

6) Carbide bit construction is essential.

Dust Control

Dry machining operations on glass reinforced polyesters produce a fine powder or dust which may cause unpleasant skin irritation upon first exposure. Operators working with this material regularly will, however, quickly become immune to this annoyance. Occasionally, if proper cleanliness is disregarded over an extended period, a skin rash may occur. This is not of a permanent nature and is invariably due to failure to bathe completely and regularly or failure to wear clean clothes daily. It is quickly corrected and easily avoided, when proper rules of cleanliness are observed. When production operations are equipped with suitable means of dust removal, this matter is not a problem. And many operations such as blanking and shearing require no dust removal devices.

Cementing

1) Lap joints of modest shear strength, (200 to 500 p.s.i.) can be obtained and are entirely practical where prying, peeling, or shock loading is negligible.

2) The only really strong cemented joint design is that of one tubular section pressed into another, where only pure shear loads are possible.

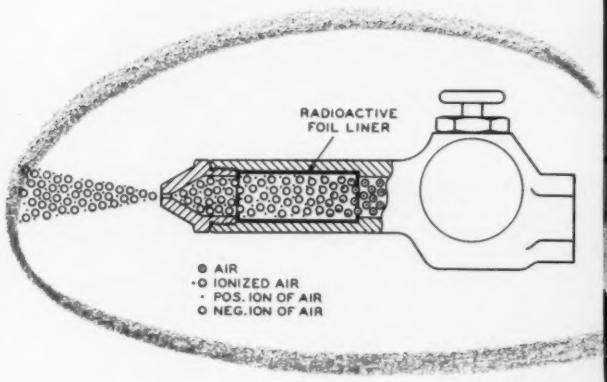
3) Surfaces to be bonded should be lightly sand-blasted (or very carefully and thoroughly sanded or machined) prior to cementing, since very little bond is obtained against a plain as-molded surface.

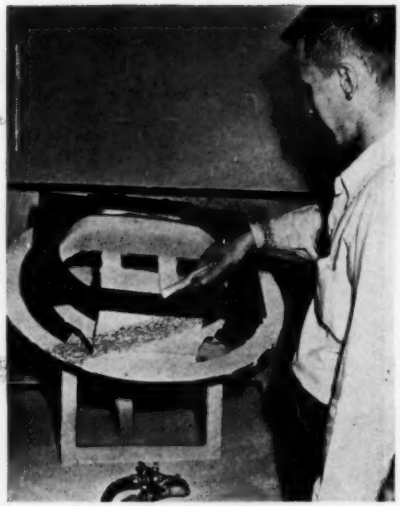
4) Bonds to metal are generally very poor unless mechanical gripping can be designed into the joint.

5) Polyester resins appear to work as well as any other adhesives on polyester laminates.

6) Thin glue lines are very desirable for best strength.

7) Much work remains to be done on the subject of adhesives, and the above observations may be knocked into a cocked hat by new discoveries at any time. Basically, however, the strength of glass reinforced polyesters derives largely from the relatively long glass fibers which reinforce it, and no cemented joint can possibly produce a continuous flow of these fibers through and across the joint itself.





Illustrations courtesy Reco

Above: Sketch of blow gun with static neutralizer in nozzle. Air forced across polonium-surfaced lining (center) becomes ionized. Ionized air blown over styrene piece (right) neutralizes surface and also removes dust preparatory to painting

Static Neutralizer for Plastics

STATIC electricity has long been a problem in many plastics manufacturing operations. One solution to the problem is the Alphatron static neutralizer recently announced by Reco, New York, N. Y. This unit utilizes alpha rays emitted from the element polonium to ionize the air adjacent to statically charged surfaces, thereby neutralizing the charge.

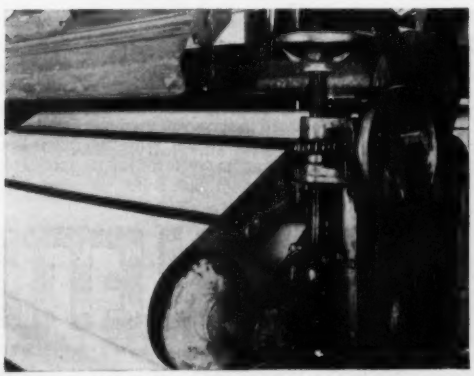
To make an Alphatron static neutralizer, polonium is electrochemically deposited on a supporting medium of brass or nickel. Practically any geometric shape can be activated, and no accessory apparatus is needed. Thus the eliminators can be installed in small spaces, or the supporting metal can be a part of the machinery or equipment itself.

To keep the polonium intact, a thin, closely-adhering cover of gold is applied by electroplating, and a thin plastic lacquer is sprayed over that.

One application of the Alphatron static eliminator is in the factory of Morart Gravure Co., Holyoke, Mass. Flexible vinyl film was being printed in up to four colors. Static which formed immediately after the first color impression attracted dust particles to the film. The dust particles depressed the film sufficiently to prevent contact with the ink for a considerable area around each particle. Furthermore, the dust particles were picked up by the printing roll and collected under the doctor blade. Sometimes the accumulation of such particles was sufficient to lift the doctor blade and allow streaks of ink to remain on the printing roll, thus spoiling the impression.

The problem was solved by mounting Alphatron static eliminators within 1 in. of the film, thus neutralizing static immediately after its formation at each printing roll.

Another application was in the plant of Mack Molding Co., Wayne, N.J. There the problem was dust which caused nippling of the surface in spray finishing styrene television bezels. Air blasts removed the dust only momentarily because the static re-attracted it. A blow gun with a static eliminator in the nozzle was then tried. When the ionized air from this gun was blown over the bezel, it simultantously removed the dust and neutralized the surface to prevent re-attraction.



Static neutralizer (lower horizontal bar) is mounted within 1 in. of vinyl film being printed in four colors. Ionization of air stops dust collection during printing, which would spoil color impression. Under surface of bar has polonium coat

WHEN NEEDED...a specialist

Yes—it is often a matter of life and death for a product, too, to operate without a specialist.

That is why Marblette, the organization, has gathered together a brilliant group of specialists in plastics; that is why Marblette, the plant, has slowly built up the special machinery necessary to give you the special formulation in each liquid phenolic resin we produce that matches *your* special production requirements, *your* special market problems.

Marblette's liquid phenolic resins are the thermosetting plastics which can be set either by heat or at room temperature; they are weather-proof, solvent-proof, fungi-proof; resistant to abrasion, heat and temperature.

Let Marblette's 20 years' experience help you in solving your liquid phenolic resin needs—in drums or tank car quantities. Our plant and offices are strategically located to serve you promptly anywhere in the United States. Write "Marblette Engineering" to create for you the special phenolic resin best suited to your special needs.

liquid phenolic resins

Resins for foundry match-plates or patterns	Bonding resins	Wood coating
	Low pressure laminating resins	Plastic cements
Heat and acid resistant resins		Metal coating
Bristle setting cement	Laminating varnish	Insulating varnish

MARBLETTE

37-21 Thirtieth Street • Long Island City, N. Y. • ST 4-8100

CHICAGO • LOS ANGELES • TORONTO • HAVANA

Photographic Study of the Polymer Cycle in Injection Molding

by G. D. GILMORE and R. S. SPENCER†

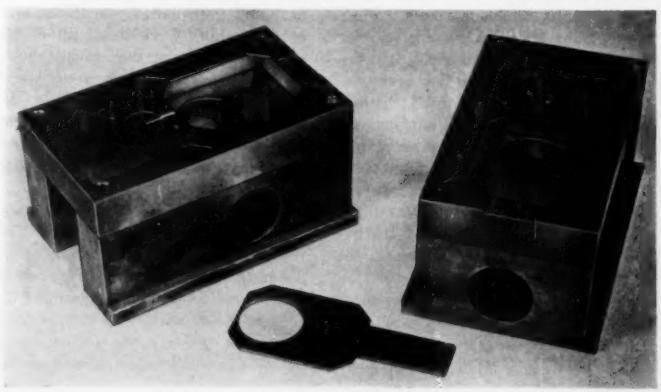
THE behavior of polystyrene in the injection molding cycle has been explained by means of pressure measurements in the mold cavity[1]. Such measurements have provided a picture of the polymer cycle which has several distinct features. The machine cycle, which is considered a primary control, is but one variable among many that together determine the polymer cycle. The polymer cycle, as the resultant of the many machine variables, is one very important basic factor in the injection molding process.

Since the polymer cycle is obtained by the measurement of a condition of the polymer at one point, it represents only the behavior of the polymer in that one region of the cavity. For a cavity of very simple shape with a single relatively heavy section throughout, the polymer cycle determined at a central location represents the general behavior of the polymer in the whole cavity. The polymer cycle from a simple cavity is easily understood and illustrates the basic phenomena occurring in any mold cavity.

When broken down into its several components, the polymer cycle provides a fundamental approach to the understanding of seemingly complex problems. For example, the length of time required to fill a mold determines to some extent the surface condition of the molding, and the peak pressure in the cavity reveals the efficiency of pressure transmission in the system. Another component of the polymer cycle, the packing time, indicates the relative amount of frozen orientational strain. The sealing temperature and pressure define the mass of polymer retained in the cavity, from which the mold shrinkage can be calculated. The tendency of the molding to stick in the cavity or to score on release is the result of too high a residual mold pressure. For given molding conditions, the polymer cycle indicates the minimum cycle of operation.

While the local polymer cycle is useful in describing the general behavior of the polymer in a simple cavity it would have little meaning for a cavity of complex shape. A cavity of complex shape would be one with a high ratio of area to average section thickness or one with a number of different section thicknesses. In such a cavity the variation in conditions from point to point would appreciably affect the behavior of the polymer. The polymer cycle, however, should still be useful in describing the behavior in regions which approximate a simple cavity. Although pressure measurements have been useful in establishing the polymer cycle, confirmation of the basic phenomena involved can best be gained by actual observation. In the die casting field, the behavior of die

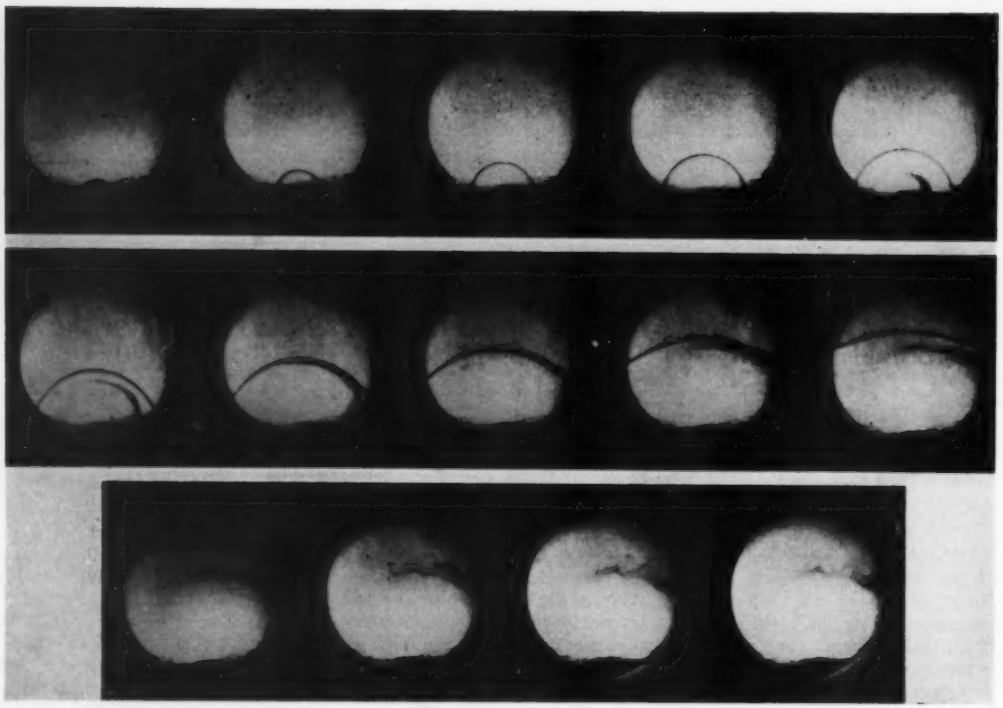
1—At the left and right are the two halves of "Photo Mold." Center: The window cavity



* Reg. U. S. Pat. Office

† Plastics Basic Research Laboratory, The Dow Chemical Co.

[1] G. D. Gilmore and R. S. Spencer, "Role of pressure, temperature, and time in the injection molding process", MODERN PLASTICS 27, 143 (Apr. 1950).



2—During filling of the cavity, shown at intervals of 0.06 sec., the polymer front moves across the mold

casting metals in the cavity has been studied by direct observations in cavities with glass sections[2]. Since this work was successful, it seemed advisable to attempt the same thing with a plastics injection mold. An injection mold was constructed along conventional lines with glass wall sections to permit direct observation of the behavior of the polymer in the cavity.

This mold, which has been called the "Photo Mold," is shown in Fig. 1. Like a conventional mold, it consists of two parts; each half contains a glass plate 1¼ in. thick. These plates form the two flat surfaces of a disk-shaped cavity. The glass plates were highly tempered to withstand high pressures and temperatures. The cavity is a 2-in. diameter hole in a flat ground steel plate 0.100 in. thick. This steel plate lies between the glass plates when the mold is closed. The cavity is viewed with a mirror arrangement through two holes at right angles in each half of the mold. This permits lighting the cavity through one half of the mold and viewing through the other half. All surfaces of contact between metal and glass were coated with a Silastic compound to prevent pressure concentrations on the glass plates. The polymer enters the cavity from a conventional sprue, runner, and gate arrangement. In operation, shots were made on a 90-sec. total cycle at various machine conditions. Motion pictures were taken of representative shots at 64 frames per second. Due to space limitations, only a few selected sequences can be considered in this paper.

The polymer cycle, established by pressure measurements and referred to in reference 1 as the mold pressure cycle, was broken down into the following sequence of events: dead time, filling, packing, discharge, sealing, and sealed cooling. These will be discussed in some detail in the light of observations made with the photo mold.

Dead Time

The dead time is of little significance except as it adds to the total cycle time. It is the time required to move the plunger into contact with the granulated polymer in the heating chamber and build up sufficient pressure to start the flow of hot polymer material into the mold passages.

Filling the Mold

The problems involved in any attempt to treat quantitatively the filling of the mold are very complex. Polystyrene is a non-Newtonian material, that is, the flow rate is very sensitive to changes in pressure gradient under typical filling conditions. The flow rate is sensitive to temperature changes also, and during filling the hot polymer is chilled by the cold mold walls. Add to this the geometrical complexity of the flow channels in the mold, and one

[2] W. Koster and K. Hohring, "Study of the flowing and filling process in die casting by means of motion pictures", Die Giesserei 3, (26), 521 (1941).

Many Industrial Products Start Here

Mosinee "fibres that work for industry" depend upon a reforestation program which not only assures trees for the future but protects our forests today. Mosinee Industrial Forests, augmented by aid in planting waste land, make raw material supply secure and ever-growing. From seedlings to technically controlled papers, MOSINEE safeguards every step in the process of making Mosinee Fibres that work for industry.

MOSINEE PAPER MILLS COMPANY, Mosinee, Wisconsin

MOSINEE makes fibres work for industry

senses the difficulties involved in any theoretical approach. In such a case as this the photo mold just described can contribute much to our understanding of the pattern of flow during filling of the mold with hot polymer.

During filling, the front of polymer moves across the mold as shown in Fig. 2. The successive forms taken by this front are shown in more detail in another paper[3]. In this type of flow between parallel planes it might be expected that the front would consist of a portion of a circle of ever-

Table I—Constants in the Filling Time Equation for the Box Mold

Mold wall temperature	B^a	α
°F.		
90	11.4	4.4
120	6.15	4.4

[a] The units corresponding to these values for B are f in seconds, η in poises, and P_M in units of 10^3 p.s.i.

increasing radius, with the gate at the center. This would no doubt be the case except for the influence of the circumferential wall. In the early stages of filling, the wall exerts a retarding force, and the front bends back toward the gate near the wall. Later, during filling, another effect becomes predominant. If the wall were not present, the polymer would flow radially into the cavity from the gate. The curved wall deflects the material which would strike it in radial flow, and this deflected polymer bends the wall ends of the front away from the gate. As a result, the front eventually becomes almost straight and then curves away from the gate just prior to completion of the filling operation.

Now let us consider what is going on in that portion of the mold which is already filled. To make the picture clearer let us follow one particular bit of polymer. In frame 5 of Fig. 2, we see a streak of black polystyrene which has just entered the cavity. In the frames that follow, the black streak moves across the mold at a velocity greater than that of the front, and in frame 8 it has caught up with the front. At this point it is found to remain stationary while the front proceeds across the mold. From this and similar observations, it may be deduced that two types of regions exist in the polymer in the mold during filling. Along each mold surface, there is a layer of stationary, chilled polymer. Between these stationary layers there is a central core of fairly hot, flowing polymer. At the front, the material flowing through the central region is forced outward against the cold mold surface and is chilled, subsequently remaining motionless while the front moves on. Packing and discharge, which follow the completion of the filling process, takes place within the central, fluid region.

It was mentioned that the black streak in Fig. 2 moved faster than the front. Comparison of these velocities permits estimation of the thickness of the fluid core. Under a typical set of conditions, this was found to be 40% of the thickness of the disk.

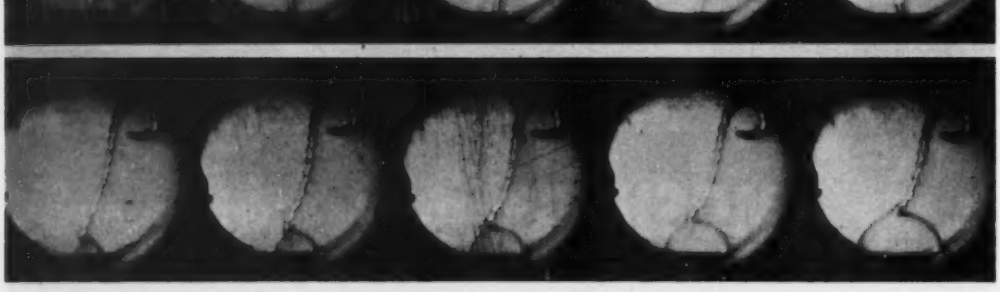
Table II—Comparison of Calculated and Observed Filling Times

Ram pressure	*Viscosity*	*f (calc.)*	*f (obs.)*
10^3 p.s.i.	*poises*	*sec.*	*sec.*
10	9,100	4.13	4.7
12	12,960	2.63	2.7
14	9,100	0.94	1.2
14	62,500	6.42	6.7
16	80,500	4.60	4.7
19	38,600	1.05	1.2
19	210,000	5.75	6.7

Some features of filling may be given a little more quantitative treatment. It was pointed out in reference 3 that the length of time to fill the mold, f, is related to the melt viscosity, η, and the ram pres-

[3] R. S. Spencer and G. D. Gilmore, "Some flow phenomena in the injection molding of polystyrene", J. Colloid Science, In Press.

3—"Jetting," observed at intervals of 0.03 second. The gate dimensions were 0.020 by 0.030 by 0.040 in. land



products for plastics... by WITCO

Nine of the many dependable chemicals made in Witco's own plants for the plastics industry.

WITCO Stabilizer No. 70
Provides excellent protection against vinyl resin deterioration caused by heat and light.

WITCO Cadmium Stearate
A stabilizer for vinyl resins against heat and light.

WITCO Lead Stearate
Lubricant and stabilizer for vinyls where transparency is not a factor.

WITCO Lead Stearate No. 50
High lead content stabilizer and lubricant for vinyls.

WITCO Calcium Stearate
A non-toxic vinyl stabilizer.

WITCO Zinc Stearate
An excellent internal lubricant, mold lubricant, or dusting powder.

WITCO Barium Stearate
Vinyl stabilizer for high temperatures.

WITCO Black No. 100
An excellent uncompressed channel black for pigmenting plastics.

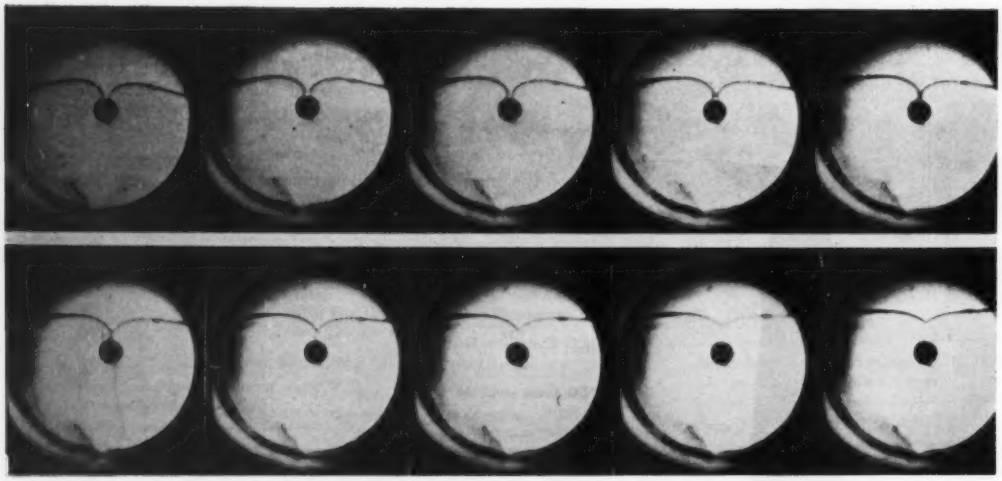
WITCO Black No. 11
A dustless channel carbon black with excellent coloring power for plastics.

For complete details on these products write today.

Section of Semi-Works Plant

WITCO CHEMICAL COMPANY • 295 MADISON AVE., NEW YORK 17, N.Y.

Los Angeles • Boston • Chicago • Houston • Cleveland • Akron • San Francisco • London and Manchester, England



4—Sequences of flow around a circular insert (0.25 in. in diameter), photographed at intervals of 0.03 second

sure, P_M, according to the approximate equation:

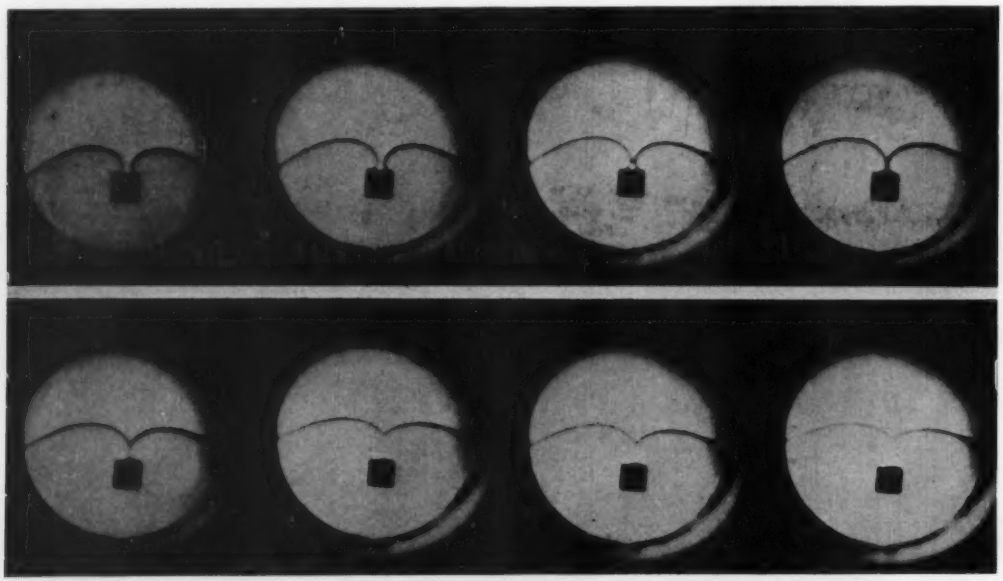
$$f = B\eta(P_M)^{-\alpha} \quad (1)$$

where B and α are constants. Using the box mold of reference 1 with a 12-oz. commercial injection press, values of the constants were determined as shown in Table I. The variation of B with mold wall temperature is an indication that the thickness of the stationary, chilled, surface layer varies with the temperature conditions.

A few examples showing the agreement between this approximate equation and experimentally observed filling times are shown in Table II. In general, quite good agreement has been noted for a variety of materials examined against this equation.

A precautionary note should be sounded in connection with the application of the filling time equation. Most presses are characterized by a certain maximum rate of injection which is defined by the maximum oil pumping rate and the ratio of polymer displacement to oil dis-

5—Photographs taken at intervals of 0.03 sec., showing flow around a square insert, 0.25 in. on one side



Opaque Colors Pay off in Plastics

you can control opacity with UNITANE (TITANIUM DIOXIDE)

Choose the right UNITANE titanium dioxide for your particular processes, and you get opacity and whiteness in any desired degree without excessive loading or processing changes.

UNITANE also assures excellent color retention, ease of dispersion, a high degree of brightness and low reactivity.

CALCO's Technical Service Staff, with the facilities of its full-time plastics research laboratory, helps to maintain and improve the quality of your plastics products.

Calco Products for the Plastics Industry

Pigments
- Ultramarines
- Cadmiums
- Chrome Yellows, Oranges and Greens
- Phthalocyanine Blues and Greens
- Iron Blues
- Organic Toners and Lakes

UNITANE (Titanium Dioxide)
- Anatase and Rutile Types

Dyes
- Oil Soluble Dyes
- Spirit Soluble Dyes
- Nigrosines
- Specialties

Calco

AMERICAN Cyanamid COMPANY

CALCO CHEMICAL DIVISION
DYESTUFF DEPARTMENT
BOUND BROOK, NEW JERSEY

New York • Chicago • Boston • Philadelphia • Charlotte • Providence

Table III—Comparison of Calculated and Observed Injection Pressures

Polystyrene	T_o	T_1	f	P_M	P_1 *(calc.)*	P_1 *(obs.)*
	°F.	°F.	sec.	10^3 p.s.i.	10^3 p.s.i.	10^3 p.s.i.
1	90	490	6.7	10.0	3.5	3.5
1	90	480	1.7	14.0	8.0	7.4
1	90	441	1.7	18.0	9.8	9.7
1	90	430	1.7	19.0	10.4	10.3
1	90	417	4.7	16.0	6.0	6.9
1	90	405	2.7	19.0	8.7	9.5
2	90	400	1.2	20.0	11.8	11.8
2	90	400	1.6	18.0	10.8	10.1
2	90	400	2.7	16.0	8.7	8.1
2	90	400	6.4	14.0	5.5	5.6
2	90	350	4.9	20.0	9.4	9.1
2	120	500	1.6	10.0	5.1	5.3
2	120	450	2.8	12.0	5.3	5.9
2	120	400	1.6	16.0	9.5	9.1
2	120	350	7.0	18.0	6.7	7.6

placement. For any particular mold, this maximum rate of injection gives us a minimum filling time. Suppose the pressure control is set so high that the equation would predict a filling time less than this minimum. As a result, the actual pressure achieved during filling will fall below the value set on the control. In such a case the filling time will predict the actual pressure during filling, if we substitute for f the minimum filling time. The filling time equation, as given above, presupposes that viscous flow is the only mechanism by which polymer moves throughout the press and mold.

To complete the analysis, we have now to consider what is happening just ahead of the ram, where the polymer is still primarily granular in form. If the cylinder wall in this zone is heated, the surface of the granules contacting the wall is softened and the whole plug-like mass moves ahead by viscous flow of the softened polymer at the wall. In this case the filling time equation would apply as given. If, however, the cylinder wall in the granular zone is too cool to soften the polymer appreciably, we must consider the friction between polymer and cylinder wall. In a former paper[4] it has been shown that this friction reduces the pressure at the forward moving end of the granular plug to:

$$P_M^* = P_M e^{-\frac{4\mu L_o}{D}} \qquad (2)$$

where μ is the coefficient of friction of polymer on cylinder wall, L_o is the uncompressed length of the granular plug, and D is the diameter of the cylinder. With this addition, the filling time equation becomes:

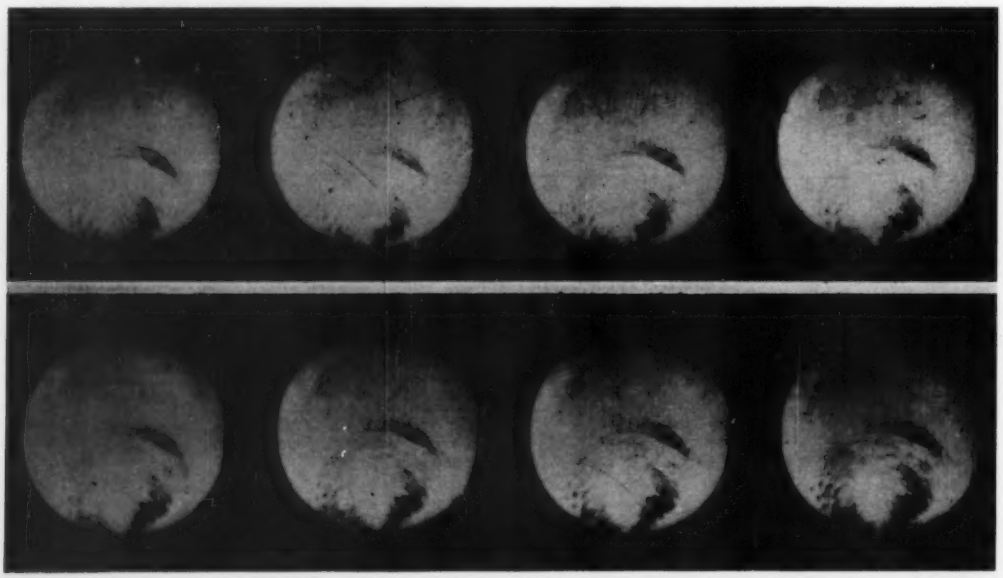
$$t = B\eta(P_M)^{-\alpha} e^{\frac{4\alpha\mu L_o}{D}} \qquad (3)$$

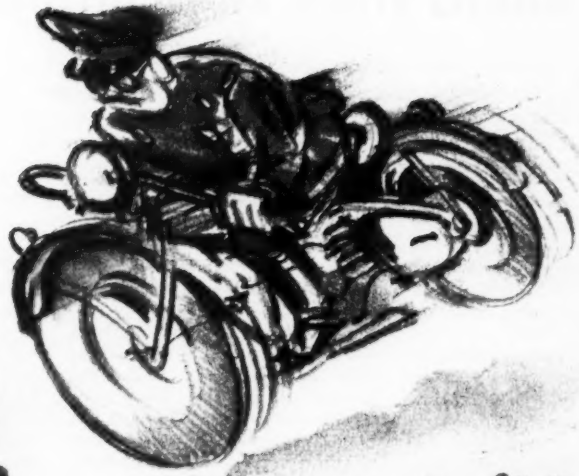
Under some conditions this is really the same form of equation as the one given previously, only with a

(*Continued on* p. 180)

[4] R. S. Spencer, G. D. Gilmore, and R. M. Wiley, "Behavior of granulated polymers under pressure," J. App. Physics *21*, 527 (1950).

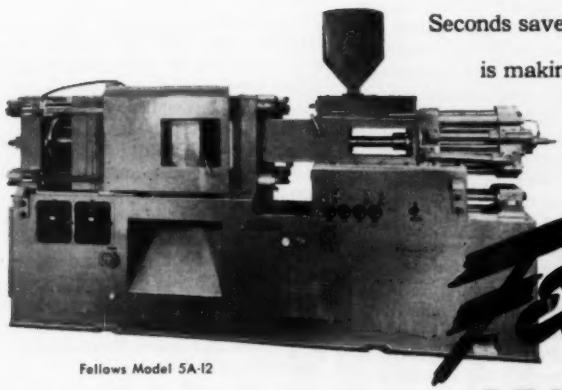
6—A series of frames, taken at intervals of 0.015 sec., illustrating packing of the mold cavity





Watch the "Speed Cycle"!

It's unique... the Fellows introduction of a two-speed injection stroke. First, a long-travel, rapid advance, then a short, sharp 20,000 psi 'big push'. Seconds saved! Fellows extra molding speed is making extra money for some smart operators. Want to speed up, too? We'll be glad to get in touch.



Fellows Model 5A-12

Fellows

LEOMINSTER

injection molding equipment

THE FELLOWS GEAR SHAPER CO., Plastics Machine Div., Head Office & Export Dept., Springfield, Vt. Branch Offices: 616 Fisher Bldg., Detroit 2. 640 West Town Office Bldg., Chicago 12 • 2206 Empire State Bldg., New York 1 • New England Distributor: Leominster Tool Co., Leominster, Mass.

Hard Board from Agricultural Residues

by R. V. WILLIAMSON and E. C. LATHROP*

REPEATEDLY, the suggestion has been made that a large-volume outlet for agricultural residues, such as rice hulls, peanut shells, and flax shives (the waste from seed flax tow manufacture), could be found in their use in manufacturing insulating and hard board products.

Presently, a substantial volume of the longer fibered portion of flax shives, obtained by screening, is going into the manufacture of insulating board in a plant in Iowa where the fiber is blended with wood fiber. The fibers in rice hulls, peanut shells, corncobs, and like wastes are too short to produce acceptable insulating boards as made by the generally employed "wet" process technique of manufacture.

With successful industrial development of the "dry" production process using synthetic resins as a binder to produce hard board from wood waste, it was desirable to undertake a preliminary study of the type of product which could be made from the residues in question.

In addition to being able to use short fibered wastes, the "dry" process has several distinct advantages as compared with the "wet" manufacturing process: 1) Location of the plant is not limited to proximity of a large water supply, and stream pollution is not a problem; 2) costs involved in the handling and evaporation of large amounts of water are eliminated; and 3) the process may be operated on a relatively small scale so that capital requirements are comparatively low. The principal disadvantage is the high cost of the synthetic resin binders required, resulting in relatively high manufacturing costs.

Commercial development of the dry process has depended on the solution of difficult mechanical problems incident to mixing the wastes and the resin, evenly distributing the mixture into molds so that a uniform product would result on pressing under heat, and combining these steps into a continuous and as automatic a process as possible. The resin manufacturers have contributed in developing special thermosetting resins which act as effective binding agents in amounts as low as 7 or 8% of the weight of the board.

Two processes for producing hard board from agricultural residues were explored in a preliminary fashion: 1) By high temperature treatment of the ground residues and Vinsol, a commercial resin obtained as a by-product in the manufacture of wood rosin; and 2) by hot pressing a mixture consisting of ground residue, phenol-formaldehyde resin, and pine gum.

Ground Residues and Vinsol

One of us[1] in 1935, while conducting research for a lumber company on wood utilization, discovered that a highly water-resistant product could be made by pressing oven-dried ponderosa pine blocks or sawdust in a mold for a short time at the temperature of incipient destructive distillation. Later, Stamm[2, 3, 4] and co-workers reported that wood could be materially stabilized against dimensional changes brought about by changes in humidity by heating the wood to high temperatures under inert gases, molten metals, or metal salts without subjecting the wood to mechanical pressure.

One of the important problems in the production of building materials is to obtain high dimensional stability; therefore, it appeared desirable to explore a process based on the principle of high-temperature heating. Ponderosa pine contains 6 to 12% pitch. The agricultural residues contain no pitch, and from preliminary experiments it was evident that some pitch-like or resin product should be added to the ground residue. While a number of products, such as asphalt pitch, rosin, and ester gum, were tried, Vinsol resin proved to be best suited for the purpose. This product is available at 4¢ per pound.

Preparation of Boards

The agricultural residues were ground in a rotary cutter fitted with a screen having $^{5}/_{32}$-in. diameter holes. Compositions containing 15, 20, and 25% Vinsol were prepared by mixing for 5 min. in a dough-type mixer followed by mixing in a Banbury for 2 min. at 230° F., and then grinding in a burr mill to pass a No. 20 U. S. Standard Screen. Compositions containing 30 and 35% Vinsol were mixed on hot rolls in a rubber mill.

The board was formed in a 6- by 6-in. mold which consisted of steel bars $1^{7}/_{8}$ in. high by $1^{1}/_{8}$ in. wide secured together with cap screws. To form the bottom of the mold, a steel plate $^{1}/_{2}$ in. thick and a polished stainless steel plate $^{1}/_{16}$ in. thick, both with $^{1}/_{64}$-in. clearance, were dropped into the frame. To produce a board about $^{1}/_{4}$ in. thick, 200 g. of the mixture were placed in the mold and distributed as evenly as possible. The mold was closed with a polished stainless steel plate followed by a steel plate $1^{1}/_{2}$ in. thick, and these plates were pressed down evenly by hand. The filled mold was then heated between electrically-heated platens. Thermometers in both press platens and in the top steel plate of the mold permitted determination of temperatures. When the mold reached a temperature of 500° F., with a platen temperature of 510° F., considerable generation of fumes occurred. Heating was continued until fuming practically stopped, generally about 1 hr. after the mold reached the maximum temperature.

The hot mold was removed and placed in a press with platens at about 212° F. A pressure of 100 p.s.i. was applied to the mold for 15 sec. and then a pressure of 2000 p.s.i. for 1 min., after which the pressure was reduced to about 100 p.s.i. while cooling the mold (about 9 min.) to 250° F. The mold was then opened and the specimen removed. The formed panel

* Northern Regional Research Laboratory, Peoria, Ill., one of the laboratories of the Bureau of Agricultural and Industrial Chemistry, Agricultural Research Administration, U.S. Dept. of Agriculture.

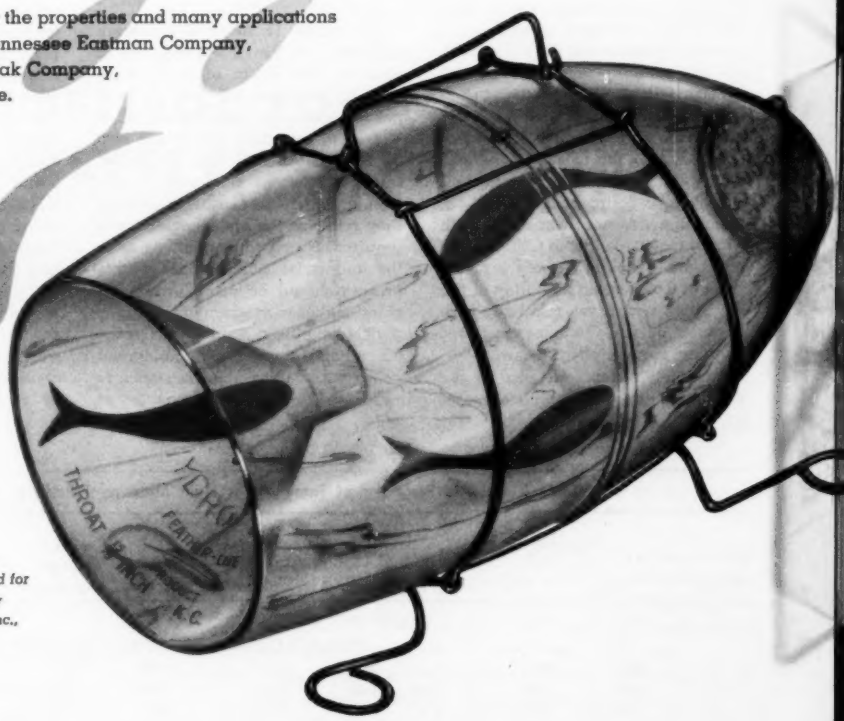
[1] R. V. Williamson, unpublished data.
[2] A. J. Stamm and L. A. Hansen, Ind. Eng. Chem. *29*, 831 (1937).
[3] A. J. Stamm, U.S. P. 2,296,316 (1942).
[4] A. J. Stamm, H. K. Burr, and A. A. Kline, Ind. Eng. Chem. *38*, 630 (1946).

Shatterproof clear Tenite, flecked with brown and green, forms the Hydro-Jet camouflage minnow trap—a torpedo-like and noncorroding structure molded in two main pieces permanently bonded with solvent cement. Nicely balanced in a light wire frame, the trap can be easily anchored even in swift water, floats if accidentally dropped overboard. Venturi design and deep inward projection of throat make possible economical feeding of bait in a direct line with the funnel.

Tenite's exceptional resistance to breakage and corrosion adapts it readily to applications in which toughness and good weathering qualities are essential—including such uses as tool handles, instrument housing, and a wide variety of sporting equipment. Tenite offers an infinite choice of chipproof colors, too, and can be molded or extruded to close tolerances.

For further information about the properties and many applications of Tenite, write Tennessee Eastman Company, Division of Eastman Kodak Company, Kingsport, Tennessee.

tough trap



Hydro-Jet minnow trap molded for Fairfax Engineering Company by Fairfax Plastic Molders, Inc., both of Kansas City, Mo.

TENITE *an Eastman plastic*

Information regarding Tenite is also obtainable through representatives located in Chicago, Cleveland, Dayton, Detroit, Leominster (Mass.), Los Angeles, New York, Portland (Ore.), Rochester (N. Y.), St. Louis, San Francisco, and Seattle; and elsewhere throughout the world from Eastman Kodak Company affiliates and distributors.

was allowed to cool to room temperature in a desiccator after which it was weighed. Specimens were stored in the constant temperature and humidity room at 73° F. and 50% relative humidity and weighed from time to time for a period of about 9 months. Tests to determine physical properties were then made, the results of which are given in Table I.

Properties of Vinsol Boards

The outstanding properties of the boards reside in their extremely high resistance to moisture uptake and to dimensional changes under the action of water. Optimum water resistance was obtained in compositions using 25% Vinsol. Moisture uptake over a period of 9 months at 73° F. and 50% relative humidity ranged from 1.02% for rice hull to 1.68% for peanut shell boards. Water absorption after 24-hr. immersion ranged from 0.13% for rice hull to 0.46% for flax shive boards. Swelling in thickness of the rice hull and peanut shell boards after 24-hr. immersion was not measurable with a micrometer reading to 0.001 in., and horizontal swelling showed a maximum of 0.08 percent. Swelling of the flax shive board was relatively high because of tiny pimples scattered over the surface of the board.

The high water resistance of the rice hull and peanut shell boards was evidenced by essentially no change in flexural strength before and after 24-hr. water immersion. Flax shive boards gave the highest flexural strengths, 4535 p.s.i., and rice hulls the lowest, 2530 p.s.i. Even these best-strength values are not outstanding, although they would probably be sufficient for many uses. Increasing amounts of Vinsol did not improve water resistance appreciably and in some cases lowered physical strength.

The boards are black in color. They can be sawed and drilled, but are too hard to nail. They are relatively brittle as shown by the low impact values.

About 1500 lb. of air-dry residue and 500 lb. of Vinsol are required to produce 1000 sq. ft. of ¼-in. thick board. The materials' cost, at $4.50 per ton of residue and at 4¢ per lb. of Vinsol, is, therefore, $23.36 per 1000 sq. feet. To manufacture the board, several important mechanical problems must be solved, particularly as they relate to the high temperatures required. No recommendations as to the industrial possibilities of this process should be made until pilot plant studies to produce much larger panels have been completed. On the other hand, there is no commercial board with comparable resistance to water and to dimensional changes at such low raw material costs insofar as resins go. Although its strength is not as great as some commercial boards, it should find important uses under conditions where dimensional stability under varying moisture conditions is important.

Phenolic Resin and Pine Gum

Preliminary experiments with ground rice hulls and ground peanut shells with a commercial phenol-formaldehyde resin under heat and pressure showed that a board of satisfactory properties could not be produced with 7 to 8% resin. Since this same resin in the above percentage produced a satisfactory board from wood waste in a commercial plant, it was evident that either considerably greater amounts of the phenolic resin would be required or that the percentage of phenolic resin might be kept low if some other less costly resin could be blended with it. Crude pine gum obtained from the Naval Stores Div. of this Bureau was found to serve the purpose. In preliminary tests it was found that when pine gum replaced part of the phenolic resin, up to an optimum amount, in compositions of ground peanut shells, the flexural strength and water resistance of the boards increased. Replacing the phenolic resin by pine gum beyond the optimum

Table I—Physical Properties of Panel Boards From Agricultural Residues and Vinsol

Vinsol	Flexural strength[a]		Impact strength[b]		Moisture absorbed from atmosphere after 9 months' storage	Water absorbed[c]	Total water absorption	Swelling after 24 hr. in water		
	Dry	Wet	Flat	Edge				Length	Width	Thickness
%	p.s.i.	p.s.i.	ft.-lb./sq. in.		%	%	%	%	%	%
RICE HULL COMPOSITIONS										
15	2675	2975	0.44	1.21	2.58	0.44	3.02	0.12	0.25	0.00
20	3230	3200	0.36	0.46	1.95	0.21	2.16	0.40	0.00	0.00
25	2530	2470	0.35	0.43	1.02	0.13	1.15	0.04	0.05	0.00
30	2300	2685	0.41	0.48	1.06	0.14	1.20	0.08	0.10	0.00
35	2418	2828	0.42	0.51	1.02	0.10	1.12	0.00	0.05	0.00
FLAX SHIVE COMPOSITIONS										
25	4535	3240	0.55	0.47	1.05	0.46	1.51	0.08	0.03	1.21
30	4075	3080	0.39	0.27	1.05	0.35	1.40	0.04	0.00	0.49
35	2650	3086	0.53	0.74	0.98	0.29	1.27	0.45	0.51	0.47
PEANUT SHELL COMPOSITIONS										
15	1750	1825	0.46	0.20	3.00	0.92	3.92	0.12	0.31	0.00
20	1550	2090	0.33	0.40	2.65	0.75	3.40	0.12	0.10	0.00
25	3115	3430	0.41	0.55	1.68	0.25	1.93	0.08	0.05	0.00
30	3040	3170	0.66	0.64	1.60	0.25	1.85	0.08	0.00	0.00
35	3315	3020	0.59	1.70	1.20	0.21	1.41	0.00	0.10	0.00

[a] Specimens 2.5 by 0.5 in. on supports 2 in. apart; load applied 0.05 in./minute.
[b] Unnotched Izod specimens 0.5 in. wide by 0.25 to 0.33 in. thick, depending on thickness of specimen.
[c] Specimens 2.5 by 2.0 in., immersed in water at 73° F. for 24 hours.

IMPROVE

YOUR PLASTISOL FORMULATIONS WITH BARRETT ELASTEX* PLASTICIZERS

Manufacturers who have discovered the economy, ease and convenience of working with plastisols will find it advantageous to use Barrett "ELASTEX" plasticizers in their formulations.

Plastisols formulated with Barrett "ELASTEX" 28-P Plasticizer have moderately low viscosities and the drawn films exhibit good physical properties and good performance characteristics. Anyone who uses di-2-ethylhexyl phthalate in plastisol compounds will find "ELASTEX" 28-P Plasticizer one of the superior brands on the market.

In "ELASTEX" 10-P Plasticizer, Barrett offers the plastisol compounder a dispersant that is even more efficient. Plastisols prepared with this high-quality plasticizer possess lower viscosities and exhibit better storage stability than do those compounded with equivalent amounts of di-2-ethylhexyl phthalate. At the same time, physical properties such as tensile strength and tear resistance of the fused films are improved, and the films are subject to less volatile and water soluble losses. Light stability of the two types of film is equally good.

Barrett will supply, on request, a booklet giving information about plasticizers and plastisol formulations. Or should you desire, a Barrett representative will be glad to discuss your technical problems involving Barrett chemicals. Phone, wire or write today.

BARRETT* CHEMICALS

Available to the Plastics Industry

"ELASTEX" 10-P Plasticizer
"ELASTEX" 28-P Plasticizer
"ELASTEX" 50-B* Plasticizer
"ELASTEX" DCHP Plasticizer

Dibutyl Phthalate
Phthalic Anhydride
Phenol
Crystal Urea

*Reg. U. S. Pat. Off.

THE BARRETT DIVISION
ALLIED CHEMICAL & DYE CORPORATION
40 Rector Street, New York 6, N. Y.

In Canada: The Barrett Company, Ltd.
5551 St. Hubert Street, Montreal, Que.

Table II—Physical Properties of Panel Boards From Ground Rice Hulls or Peanut Shells Compounded With Phenolic Resin and Pine Gum

	Rice hulls		*Peanut shells*						*Masonite-tempered hardboard*
FORMULATION									
Residue, dry basis, %	85	80	90	90	85	80	80	75	——
Phenolic resin, %	8	15	10	8	8	12	15	15	——
Pine gum, %	7	5	0	2	7	8	5	10	——
Moisture in residue, %	Air-dry	Air-dry	15	15	8.6	8.6	8.0	8.6	——
PHYSICAL PROPERTIES									
Density	1.12	1.12	1.157	1.187	1.224	1.292	1.28	1.316	1.081
Flexural strength, dry[a], p.s.i.	1400	3100	3000	3750	4400	5500	4980	6200	6500
Flexural strength, wet, p.s.i.	——	——	1780	2000	3000	4700	——	5500	3750
Impact strength, flat[b], ft.-lb./sq. in.	0.46	0.82	0.70	0.83	0.61	0.60	0.63	0.82	3.5
Impact strength, edge, ft.-lb./sq. in.	4.3	4.5	1.0	4.7	2.4	3.3	0.75	5.1	2.8
Water absorption, 24 hr.[c], %	32.9	28.7	20.4	7.6	5.8	3.3	2.56	2.2	6.5
Swelling, 24-hr. immersion									
Length, %	3.1	2.1	1.83	0.41	0.36	0.20	0.26	0.16	0.13
Width, %	3.3	2.3	1.66	0.31	0.33	0.25	0.28	0.30	0.20
Thickness (middle), %	9.0	6.2	6.13	2.20	2.16	1.40	2.13	0.61	3.00

[a] Specimens 2.5 by 0.5 in. on supports 2 in. apart; load applied 0.05 in./minute.
[b] Unnotched Izod specimens 0.5 in. wide by 0.25 to 0.33 in. thick, depending on thickness of specimen.
[c] Specimens 2.5 by 2.0 in., immersed in water at 73° F. for 24 hours.

caused a decrease in both flexural strength and water resistance.

A study was made to determine the properties and commercial possibilities of boards made from 75, 80, 85, and 90% of either ground rice hulls or peanut shells with various proportions of phenol-formaldehyde resin and pine gum.

Preparation of Boards

The residues were ground in an attrition mill so that less than 1% failed to pass a No. 20 U. S. Standard Screen. The selected compositions of ground shells, phenolic resin, and pine gum were mixed for a few minutes in a dough-type mixer and then in a small water-cooled Banbury for 2 minutes. If too much material was mixed in the Banbury in any one charge, particle size was reduced and lumps were formed, which was undesirable. The material from the Banbury was passed through a 14-mesh screen, and oversize material was ground in a burr mill and screened again.

The aluminum experimental mold was 22 by 7 in. in inside dimensions. The frame was of 1-in. square bars fastened with cap screws, and the top and bottom plates were ½ and ¼ in. thick respectively, with 1/64-in. clearance on all sides. Two holes were provided in each end of the top plate for insertion of handles which permitted placing this plate on the material without appreciable disturbance of its distribution.

A slight excess of molding composition over that necessary to fill the mold was distributed as uniformly as possible in the mold, and the excess was removed by doctoring with a straight edge. The top plate was then carefully placed in the mold.

The high volatile content of the compounds made molding conditions quite critical. The normal volatile contents at 105° C. of the ground residues, phenolic resin, and pine gum were 8.6, 8.5, and 30.3%, respectively. The conditions for molding different compositions had, therefore, to be explored in each new case in order to determine those for the production of a board of maximum strength, water resistance, uniform color, and freedom from blisters. Best properties in the boards were obtained with the maximum volatile content permissible to give a board free from blisters. In compositions of low total resin content, the moisture content of the ground shells was adjusted to 15 percent.

At a molding temperature of 347° F., satisfactorily appearing boards could be prepared if a certain critical pressure was not exceeded, but strength and water resistance were unsatisfactory. It was found by molding at 347° F., under 300 p.s.i. for 6 min., that boards of satisfactory physical properties could be produced provided proper steps were taken to vent the mold to prevent blistering due to volatile matter. In the simplest case, the pressure was raised to 300 p.s.i. after the mold was placed in the press, then after 6 min. the pressure was released carefully until fumes appeared. Pressure was maintained at that level until fuming almost stopped, whereupon the pressure of the press was slowly released until the press opened. If a satisfactory board was not produced in this manner, an initial pressure of 50 to 75 p.s.i. was applied over a period of 1 to 3 min. with venting, if necessary, to dissipate volatile material, and then a pressure of 300 p.s.i. was applied followed by slowly opening the press. If neither of these conditions were satisfactory, the composition was heated in the dough-type mixer during the blending operation to lower volatile matter content.

Properties of Phenolic Boards

The color of the boards ranged from light tan to dark reddish brown depending on the amount of pine gum used. The finish was egg-shell to glossy depending on the polish of the mold plates. The boards could be sawed, drilled, sanded, glued, and painted, but were too hard for nailing.

(*Continued on p. 187*)

Thermex
PLASTIC PREHEATING APPARATUS

NEW! compact . . . portable . . . 3-kilowatt unit

YOU CAN heat up to 2¼ pounds of general purpose material from 80 to 250°F in one minute with the Model 3R THERMEX Plastic Preheating Unit. Much faster mold closing and curing is then possible.

The mold cavity is filled easily and quickly. Uniform softening eliminates hard cores, strengthens the structure.

Operation is simple. When the operator closes the sliding drawer, high frequency power automatically comes on. After the proper pre-set interval, power is shut off by a timer.

The THERMEX Model 3R Heating Unit is compact—occupies less than 4 square feet of floor space. It is light, mounted on rubber-tired casters for portability. All parts are readily accessible.

As the first step in boosting your plastic molding production, write for more information. The Girdler Corp., Thermex Division, Louisville 1, Ky.

THERMEX—T. M. Reg. U. S. Pat. Off.

SPECIFICATIONS

Power Data—Power Requirements: 230-volt or 460-volt, 60-cycle, 3-phase. Power Input: 6.3 KVA at 90% power factor. Power Output: 3 KW.

Heating Capacity—Electrode area of 10" by 12" will accommodate preforms up to 3¾" thick. (Special electrodes to provide larger heating area available.)

Controls—Controls on front of cabinet include electrode height adjusting knob, plate ammeter, grid meter, grid adjustment knob, timer, and main circuit breaker.

Construction—Heavy gauge aluminum cabinet contains built-in material-heating compartment with electrode and preform handling tray.

Dimensions and Weight—21" wide, 24" deep, 53¾" high. Weight: 925 pounds gross, 800 pounds net.

THE GIRDLER CORPORATION
Thermex Division

PLASTICS DIGEST*

Abstracts from the world's literature of interest to those who make or use plastics or plastics products. Send requests for periodicals to the publishers listed.

General

PLASTICS PRODUCTION REACHES NEW HIGHS DESPITE SHORTAGES. P. O. Powers. Chem. Eng. News *29*, 15-16 (Jan. 1, 1951). Developments in the plastics industry during 1950 are reviewed.

UTILIZATION OF METHOXY LIGNIN CHLORIDE BY RESINIFICATION. R. Katzen, I. Krushel, and D. F. Othmer. Tappi *33*, 244-5 (1950). Thermoplastic resins with good film properties and good water and acid resistance were made from lignin.

HAZARDS OF COMMON SOLVENTS. H. L. Hardy. Physics Today *3*, No. 7, 15-19 (1950). The maximum allowable concentrations, the symptoms, and methods for detection of benzene, volatile chlorinated hydrocarbons, and hydrocarbons are discussed.

FIRE RESISTANCE OF CABLES. Brit. Plastics *23*, 164-6 (Nov. 1950). A comparison of the flame-retardant properties of plastics-insulated and rubber-insulated electric cable shows the plastic-insulated cable to be superior. The plastics investigated in this study were polyethylene and polyvinyl chloride.

Materials

CROSS-LINKING OF PROTEIN PLASTICS. S. H. Pinner. Brit. Plastics *23*, 157-62 (Nov. 1950). Amino groups in proteins react readily with formaldehyde to form methylol bonds at room temperature, guanidino and amide groups less readily, and others hardly at all. Preformed amino-methylol groups will react under mild conditions with amide, guanidino, indole, phenol, and imidazole groups, provided that dehydrating conditions exist, but not with peptide, sulfhydryl, or carboxyl groups. No similar affinity is shown by guanidino-methylol and amido-methylol bonds except for amines and amino acids. There is evidence both for and against primary bond cross-linking in hardened casein but most of the properties of hardened casein can be explained by the steric hindrance of the bulky methylol bonds coupled with extensive hydrogen bonding.

CAUSE AND PREVENTION OF CRAZING IN UREA-FORMALDEHYDE RESINS. H. A. Collinson. Plastics Inst. (London) Trans. *18*, 1-9 (1950). A non-crazing urea-formaldehyde resinous adhesive contains the resin, furfural, woodflour, and ammonium chloride.

STABILITY OF POLYVINYL CHLORIDE. K. Tinius. Kunststoffe *40*, 191-3 (1950). The effects of time, temperature, pH, emulsifier content, degree of polymerization, and structure on the evolution of hydrogen chloride when polyvinyl chloride is exposed to heat and light are discussed. The effects of various stabilizers are considered here.

PREPARATION AND PROPERTIES OF A HYDROXYLATED POLYAMIDE. POLYHEXAMETHYLENE α α'-DIHYDROXYADIAPAMIDE. G. Beauvalet. Ann. chim. [12] *5*, 313-57 (1950); Chem. Abstracts *44*, 8690 (Sept. 25, 1950). A thermosetting polyamide prepared from hexamethylenediamine and dihydroxyadipic acid in the presence of ammonium salts is described.

POLYMETHYL α-CHLOROACRYLATE. Brit. Plastics *23*, 147 (Nov. 1950). The properties of a new transparent plastic, polymethyl α-chloroacrylate, are described. The specific gravity, softening point, heat distortion temperature, tensile strength, and hardness are higher than those of methyl methacrylate plastic.

SOLUBILITY OF POLYSTYRENE FRACTIONS IN HYDROCARBONS. P. O. Powers. Ind. Eng. Chem. *42*, 2558-62 (Dec. 1950). The precipitation points of four fractions of polystyrene were measured in mixtures of toluene and n-decane. Although the intrinsic viscosity of these fractions varied from 2.7 to 0.35, the solubility characteristics were not greatly different; low viscosity samples have a progressively greater solubility. The solubility characteristics of the fractions of 1.05 and 0.35 intrinsic viscosity were nearly identical. Solubility diagrams were drawn for all four fractions in decane-toluene mixtures, and isotherms of 20, 50, and 80° C. are shown. All samples showed a two-phase separation, and no fractions were particularly soluble in decane at ordinary temperatures. When toluene was added, the solubility was increased. There was noticeable improvement when the toluene content reached 40%; the fractions approached miscibility in all proportions at 20° C. when the toluene content of the decane-toluene mixture reached 60 percent. The solubility of these fractions is compared with expected behavior. Although the behavior agrees in a general way, quantitative agreement is not established. The addition of a good solvent causes a fraction to behave like a fraction of lower molecular weight. The higher molecular weight materials in each fraction tend to characterize the solubility of the samples, particularly in dilute solutions.

DERIVATIVES OF METHACRYLIC ACID. J. Heyboer and A. J. Staverman. Rec. trav. chim. *69*, 787-98 (1950). Methods for preparing six derivatives of methacrylic acid are reported. Four of these polymerize in the presence of benzoyl peroxide to give solid polymers. Their solubilities in various solvents are reported.

Applications

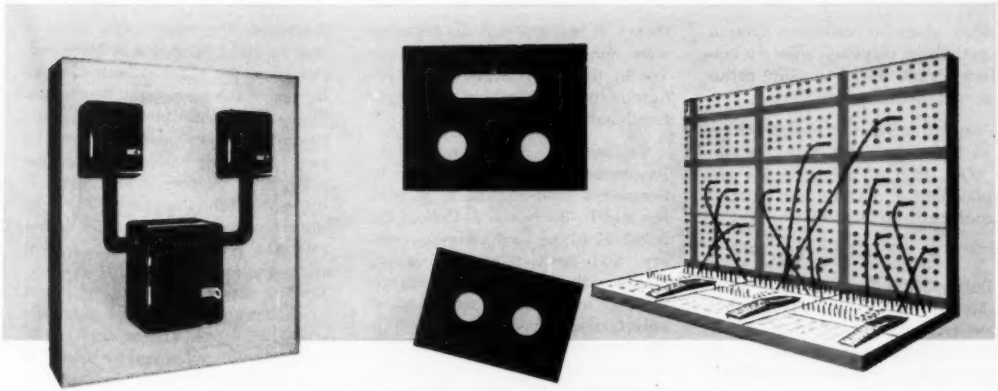
CHEWING GUM FROM SYNTHETIC RESINS. E. Benk. Süddeut. Apoth.-Ztg. *90*, 391 (1950); Chem. Abstracts *44*, 8157 (Sept. 10, 1950). The use of polyvinyl acetate and polyvinyl alcohol in the manufacture of chewing gum is described.

TINTED FILTERS FOR TELEVISION. Plastics (London) *15*, 269 (Oct.-Nov.-Dec. 1950). Tinted television filters made of transparent acrylic plastic sheet are described.

CASEIN ADHESIVES IN ROLL COATING. J. W. Smith, R. T. Trelfa, and H. O. Ware. Tappi *33*, 212-18 (1950). The properties imparted by several types of resins in the manufacture of paper were studied.

DICTAPHONE ASSEMBLY. Brit. Plastics *23*, 142-6 (Nov. 1950). Plastics used in the construction of a new Dictaphone are laminated phenolic,

* Reg. U. S. Pat. Office



for low cost, high strength

DIELECTRIC LAMINATES

everything points to

No. 5012

PLYOPHEN

RCI's No. 5012 Plyophen is a phenol base laminating varnish that has proven its merit in the production of low cost dielectric laminates. This efficient all-round varnish cures quickly at moderate pressures and may be used with either paper or canvas to produce laminates with exceptional mechanical and electrical properties. No. 5012 may be used to produce all of the general purpose NEMA grades of laminates, as well as Government grades, and the excellent properties which it confers fit it for a wide variety of end uses. For specific details and applications write the RCI Sales Department at Detroit.

REICHHOLD CHEMICALS, INC.

General Offices and Main Plant, Detroit 20, Michigan

RCI

Other Plants: Brooklyn, New York • Elizabeth, New Jersey • South San Francisco and Azusa, California • Tuscaloosa Alabama • Seattle, Washington Chicago, Illinois • Liverpool, England • Paris, France • Sydney, Australia • Sassenheim, Holland • Naples, Italy • Buenos Aires, Argentina Hamburg, Germany • Toronto, Canada • East London, South Africa • Osaka, Japan • Vienna, Austria

SYNTHETIC RESINS • CHEMICAL COLORS • PHENOLIC PLASTICS • INDUSTRIAL CHEMICALS

molded phenolic, cellulose acetate, polyethylene, polyvinyl chloride, cellulose acetate butyrate, ethyl cellulose, and molded urea.

PLASTICS IN CABLE MANUFACTURE. D. C. Hancock. Brit. Plastics *23*, 115-21 (Oct. 1950). The properties and applications of plastics used in cable manufacture are described.

Coatings

POLYSTYRENE EMULSION PAINTS. K. V. McCullough. Paint & Varnish Production *30*, No. 7, 8-10, 16-17 (1950). The manufacture, formulation, and uses of polystyrene emulsion coatings are reviewed. Polystyrene with a spherical shape of approximately 0.1 micron diameter and with a molecular weight greater than 150,000 is used.

SILICONES IN THE PROTECTIVE COATING INDUSTRY. J. J. Tyner. Finish *7*, No. 2, 30-2, 66 (1950). The use of silicones in the formulation of protective coatings is reviewed. They are resistant to chemicals in aqueous medium and to acids but are not resistant to most organic liquids.

HOT-SPRAY PROCESS FOR ORGANIC FINISHES. J. A. Bede. Finish *7*, No. 1, 25-7, 73-4, 76 (1950). The equipment and technique for applying organic finishes by the hot spray method are discussed.

COMPLETE ANALYSIS OF ALKYD RESINS. C. P. A. Kappelmeier and W. R. van Goor. Peintures, pigments, vernis *26*, 133-40 (1950); Chem. Abstracts *44*, 8155 (Sept. 10, 1950). The determination of the acid and alcohol components of various types of alkyd resins is described.

Properties

ELECTROLYTIC TRANSFERENCE PROPERTIES OF POLYMERIC ACIDS. F. T. Wall, G. S. Stent, and J. J. Ondrejcin. J. Phys. and Colloid Chem. *54*, 979-90 (Oct. 1950). A simple theory is developed for the electrical transference properties of polymeric ions, using Debye's model of a polymer molecule as a string of beads. It is also shown theoretically that electrolytic fractionation can be expected when the degrees of ionization of the polymers in the mixture are different. Experiments were made on three samples of polyacrylic acid and on the hydrolyzed copolymer of maleic anhydride with styrene. The results are in qualitative agreement with the theory. It is found that the transference numbers of polymeric anions are in the neighborhood of a few hundredths and also that electrolytic fractionation is possible.

VISCOELASTIC AND PHOTOELASTIC PROPERTIES OF POLYSTYRENE ABOVE ITS SOFTENING TEMPERATURE. L. E. Nielsen and R. Buchdahl. J. Colloid Sci. *5*, 282-94 (June 1950). Creep, recovery, and stress-relaxation experiments with simultaneous measurements of birefringence were made on polystyrene films above their softening temperature. The ratio of birefringence to stress is a constant independent of the stress, elongation, temperature, and molecular weight of the polystyrene. The data indicate that polystyrene has a semipermanent network structure. The network is most likely caused by the strong intertwining of polymer molecules.

LIGHT SCATTERING BY CONCENTRATED POLYMER SOLUTIONS. P. Debye and A. M. Bueche. J. Chem. Phys. *18*, 1423-5 (Nov. 1950). The light scattered by benzene solutions of polystyrene up to a volume fraction of polymer of 0.62 was measured. The results are compared with what is expected on the basis of recent thermodynamic theories for polymer solutions. This comparison leads to the recognition of a new and rapid method for estimating molecular weights. The method also seems to be a convenient one for obtaining thermodynamic data.

PERMANENCE OF WET-STRENGTH PAPER. C. S. Maxwell and W. F. Reynolds. Tappi *33*, 179-82 (1950). The wet strength of papers made with urea and melamine resins deteriorates rapidly on standing in a buffer solution at pH 6.0. The paper treated with urea resin is affected more.

ON CRAZING OF LINEAR HIGH POLYMERS. C. C. Hsiao and J. A. Sauer. J. Applied Phys. *21*, 1071-83 (Nov. 1950). The effect of various variables, such as type of stress, stress magnitude, duration of stressing, and environment on the initiation and development of crazing in linear polymers is discussed. The basic nature of crazing is investigated in some detail for polystyrene specimens by means of the light microscope, the electron microscope, and the x-ray spectrometer. The results of these observations and their bearing on the fundamental group structure of polystyrene molecules is presented. The relationship between crazing and orientation is discussed, as well as the effect of both of these factors on the mechanical properties. The experimental results are compared, wherever possible, with the previously reported data of other investigators. A theory of crazing is discussed from the point of view of the molecular structure of the material. The general conclusion is that crazing is an actual mechanical separation of polymer chains or groups of chains under the action of tensile stress. The stress system need not be external, as crazing can be produced by internal stresses caused by shrinkage, absorption, radiation, or combinations thereof.

Chemistry

PHOTOCATALYZED OXIDATION OF POLYTHENE. A. W. Pross and R. M. Black. J. Soc. Chem. Ind. (London) *69*, 113-16 (1950). Polyethylene of molecular weight of 11,000 to 22,000 is degraded on exposure to ultraviolet radiant energy resulting in embrittlement, deterioration of physical and electrical properties, and sorption of oxygen. The degradation reactions are explained by a free radical mechanism.

THERMAL DEGRADATION OF POLYETHYLENE POLYMERS. W. G. Oakes and R. B. Richards. J. Chem. Soc. *1949*, 2929-35. Molecular weight measurements and infra-red absorption studies were used to determine the degradation of polyethylene by heat in the range 300 to 400° C. Ethylene is evolved above 370° C. The degradation is a chain reaction mechanism in which the rupture of weak links, present in very low concentrations, initiates a further degradation at points adjacent to branches in the polymer molecule.

THE NON-STATIONARY PHASE OF CHAIN REACTIONS. I. THE PHOTOPOLYMERIZATION OF STYRENE. G. M. Burnett. Trans. Faraday Soc. *46*, 772 (Sept. 1950). By means of an adaptation of the dilatometer of Schulz and Harborth, in order to operate in vacuo and with a great increase in sensitivity, the existence of a natural induction period in the photopolymerization of styrene is shown. The method is applied to the determination of the kinetic constants for styrene polymerization, and the values obtained are in good agreement with those quoted in the literature.

Mr. Vinyl Grows Up...

with help from

S/V SOVALOID C

From a scrawny infant weighing in at a mere million pounds to a rugged, 250-million-pound giant . . . that's the story of young Vinyl's phenomenal growth in just ten years! And this great new industry is still growing . . . thanks to an important assist from Socony-Vacuum's highly efficient, low-cost plasticizer — *S/V Sovaloid C!*

S/V Sovaloid C costs but a fraction of the price of conventional ester-type plasticizers, yet gives you many special processing advantages. It adds greater tensile strength to your products . . . imparts excellent flexibility at normal temperatures . . . provides unusual oil-resistant qualities. It is completely compatible with all vinyl compounds, and will not migrate from finished products.

Here's another advantage . . . in many cases, *S/V Sovaloid C* can be used as an extender of more costly plasticizers — again reducing your processing costs and increasing your sales possibilities. Get all the facts about *S/V Sovaloid C* from your Socony-Vacuum Representative.

SOCONY-VACUUM OIL COMPANY, INC.
and Affiliates: MAGNOLIA PETROLEUM COMPANY
GENERAL PETROLEUM CORPORATION

Socony-Vacuum Process Products

Process Products
SOCONY-VACUUM

This Figure Prepared with Vinylite Brand Plastics.

U. S. PLASTICS PATENTS

Copies of these patents are available from the U. S. Patent Office, Washington, D. C., at 25¢ each.

VINYL RESINS. E. D. Serdynsky (to Dow). U. S. 2,532,245, Nov. 28. Use of lithium stearate to reduce flow viscosity offered by vinylidene chloride resins.

RESINS. A. F. Chadwick (to Du Pont). U. S. 2,532,278, Dec. 5. Production of hydantoin formaldehyde resins.

COMPOSITION. A. F. Shepard and J. F. Boiney (to Durez). U. S. 2,532,-374, Dec. 5. Rubber-phenolic resin composition.

UREA RESINS. G. E. Eilerman (to Pittsburgh Plate Glass). U. S. 2,532,-396, Dec. 5. Urea-formaldehyde resin reacted in the presence of an alcohol.

ALKYD RESIN. T. F. Anderson (to Libbey-Owens-Ford). U. S. 2,532,-475, Dec. 5. Alkyd resin stabilized with an N-aryl-hydroxy-3-naphthamide.

SILANES. D. B. Hatcher (to Libbey-Owens-Ford). U. S. 2,532,493, Dec. 5. Production of silanes from ethylene, silico-chloroform, and zinc aluminum chloride.

POLYMERS. H. A. Hoppens (to Libbey-Owens-Ford). U. S. 2,532,498, Dec. 5. Polyesters of butenedioc acid, ethylene glycol, and propylene glycol.

MOLDING. J. Johnson (to Combined Optical Industries). U. S. 2,532,501, Dec. 5. Plastic molding apparatus.

DENTURES. H. van B. Joy (to Montclair Research and Ellis-Foster). U. S. 2,532,502, Dec. 5. Plastic dentures.

SILICON POLYMER. L. W. Tyran (to Du Pont). U. S. 2,532,583, Dec. 5. Resinous polymer of vinyl silicon trichloride.

CELLULOSE DERIVATIVES. M. J. Hunter (to Dow Corning). U. S. 2,-532,622, Dec. 5. Organo silicon derivatives of cellulose.

FIBROUS STRUCTURES. K. L. Berry (to Du Pont). U. S. 2,532,691, Dec. 5. Dispersion of polytetrafluoroethylene for treating textiles.

SEALING COMPOSITION. J. B. DeCoste (to Bell Telephone Laboratories). U. S. 2,532,699, Dec. 5. Polybutene sealing composition.

COPOLYMERS. A. W. Larcher (to Du Pont). U. S. 2,532,727, Dec. 5. Vinyl chloride-styrene copolymers.

MOLDING. T. L. Fawick. U. S. 2,532,-839, Dec. 5. Making an article having a porous inner part and a molded cover thereon.

PACKAGE. M. Wagner (to Glenside Bag). U. S. 2,532,871 Dec. 5. Forming a package from thermoplastic material.

PRINTING. L. Rado. U. S. 2,532,941, Dec. 5. Process for printing plastic articles.

PLYWOOD. W. L. Alderson, Jr. (to Du Pont). U. S. 2,532,983, Dec. 5. Method for producing plywood with an adhesive of phenolic resin and polyvinyl carboxylate.

POLYMERIZING. G. D. Jones (to General Aniline). U. S. 2,533,166, Dec. 5. Process for polymerizing water-soluble polyacrylamides.

INTERPOLYMERS. J. R. Caldwell (to Eastman Kodak). U.S. 2,533,204, Dec. 12. Interpolymers of acrylonitrile, a maleamic acid, and a vinyl compound.

COPOLYMERS. J. B. Dickey and H. W. Coover, Jr. (to Eastman Kodak). U.S. 2,533,207, Dec. 12. Copolymers containing 9-methylenefluorene.

SULFONATION. M. Baer (to Monsanto). U.S. 2,533,210-1, Dec. 12. Sulfonating polystyrene with a complex of sulfur trioxide with bis-(β-chloroethyl ether) or dioxane.

RESINS. A. Cresswell (to American Cyanamid). U.S. 2,533,224, Dec. 12. Polymerizable mass containing acrylonitrile and a guanidine thiocyanate.

CALENDERING. C. E. Dill (to Armstrong Cork). U.S. 2,533,228, Dec. 12. Method of forming thermoplastic sheet.

ALKYD RESINS. O. S. Linkletter and J. L. Johnson (to Interchemical). U.S. 2,533,270, Dec. 12. Alkyd resin reaction product of a pentaerythritol ester of an unsaturated acid, an adduct of an unsaturated dicarboxylic acid with a terpene, and a trimethylol derivative.

VINYL RESIN. F. Groff (to Union Carbide). U.S. 2,533,314, Dec. 12. Polyvinyl partial acetal composition.

COPOLYMERS. J. L. Jones (to L-O-F). U.S. 2,533,376, Dec. 12. Copolymerization of maleic anhydride and allyl esters of long chain acids.

ALLYL CHLORIDE. P. H. Carnall (to Phillips Petroleum). U.S. 2,533,425, Dec. 12. Polymers of allyl chloride.

CONDENSATES. H. J. Hagemeyer, Jr. (to Eastman Kodak). U.S. 2,533,-455, Dec. 12. Condensing primary amines with bis(diazodiketo) alkanes.

MOLDING. H. F. Jurgeleit (to U.S. Rubber). U.S. 2,533,468, Dec. 12. Injection molding unit.

POLYMERIZATION. F. H. Snyder (to Irving L. Rabb). U.S. 2,533,525, Dec. 12. Polymerizing styrene using phthalimide as catalyst.

MANUFACTURING PROCESS. T. M. Nolan and S. Gasper (to Bell Aircraft). U.S. 2,533,609, Dec. 12. Deforming a plastic, drilling, and reheating to allow retention of original shape whereby a minute orifice is provided in the plastic.

FOAM RESIN. F. Rosenthal. (to R.C.A.). U.S. 2,533,629, Dec. 12. Polystyrene foam.

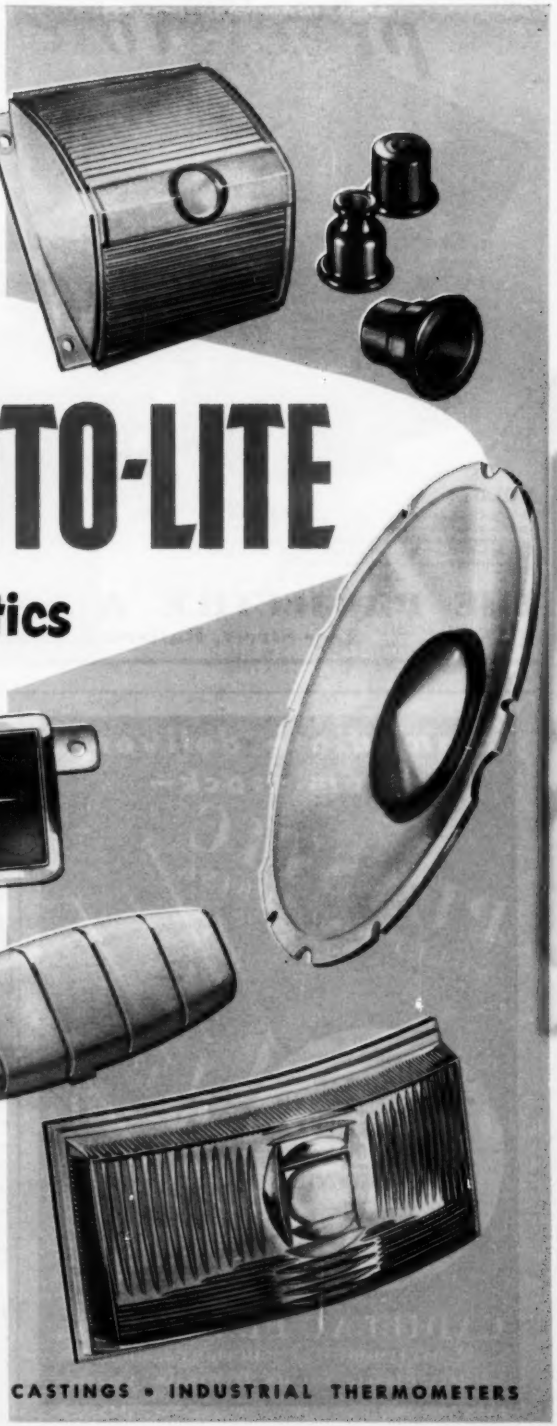
PRINTING COMPOSITION. R. B. Seymour (to Monsanto). U.S. 2,533,-635, Dec. 12. Printing dye paste comprising styrene-maleic anhydride-divinylbenzene copolymer.

RESINS. P. D. Caesar and A. N. Sachanen (to Socony-Vacuum). U.S. 2,533,764, Dec. 12. Heterocyclic thiol resins.

PROCESSING APPARATUS. H. Harris and L. M. Ware (to Auburn Research

You're always right with AUTO-LITE

Plastics

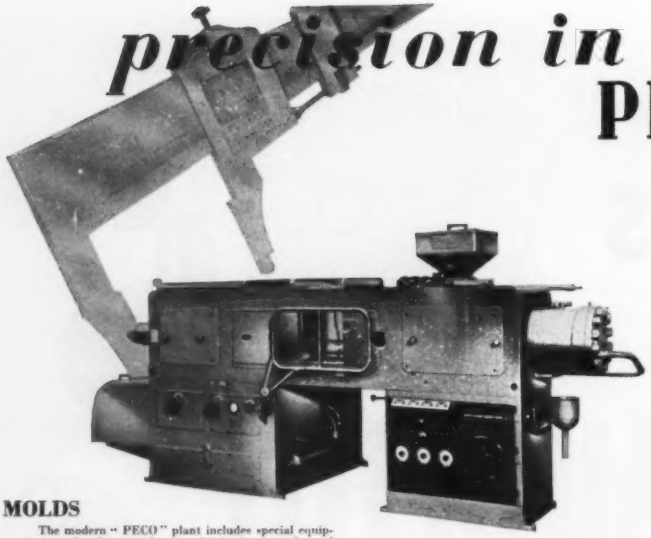


• Plastics and plastic-metal combinations are opening new fields in design as illustrated by these few of many assemblies made by Auto-Lite. Here under one roof at Auto-Lite's great Bay Manufacturing Division in Bay City are the technical skills and production capacity for a new art rendered in plastics. The artistic skill of Auto-Lite's Art and Style Division is available on matters of design and development. Address inquiries to:

THE ELECTRIC AUTO-LITE COMPANY
Bay Manufacturing Division
723 New Center Bldg., Detroit 2, Mich. • Bay City, Mich.
Tune in "Suspense!"... CBS Radio Thurs.... CBS Television Tues.

PLASTICS • WIRE & CABLE • DIE CASTINGS • INDUSTRIAL THERMOMETERS

precision in PLASTICS



"PECO" Injection Molders enable YOU to increase production and ensure high quality moldings. Write now for full particulars and specification. Available in 2, 4, 6, 8 and 16-ounce capacities.

MOLDS

The modern "PECO" plant includes special equipment for the manufacture of injection transfer and compression molds and hobbed cavities to customers' specifications. Molds of all sizes up to the largest required by the industry can be handled.

PECO injection molding machines

Illustrated Details on request.

THE PROJECTILE & ENGINEERING CO. LTD.

Telephone: MACaulay 1212
Cables: Profectus, London

Acre Street, Battersea, London, S.W.8, England

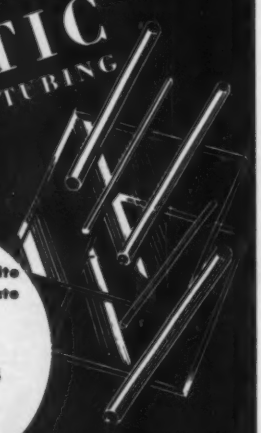
Telegrams: Profectus, Claproad, London

---

immediate delivery from stock—

PLASTIC

SHEET ROD TUBING



• Plexiglas • Vinylite
• Lucite • Acetate

WHATEVER YOUR REQUIREMENTS WE CAN FILL THEM!

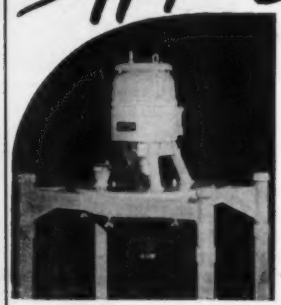
1st and 2nd Grade Inventories and Price Lists on Request

CADILLAC PLASTIC co.

653 W. BALTIMORE • DETROIT 2, MICHIGAN

Largest Plastic Supply House In America

NEW *High Speed* MIXER



- **Reduces Pre-Mixing Time**
- **Provides Complete, Uniform Dispersion of Plastics Ingredients**
- **Improves Color Blending**

The "ENTOLETER" Mixer provides the simplest, most economical method of producing a homogeneous mix. It is easy to install and operate. Requires only 12 cubic feet of space; yet can produce a finished mix at rates up to 200 lbs. a minute. It is adaptable to either batch or continuous mixing. Entoleter Division, The Safety Car Heating & Lighting Co., Inc., 1195 Dixwell Ave., New Haven 4, Conn.

Send for bulletin and reprint describing results on plastics applications.

ENTOLETER
CENTRIFUGAL MACHINES

Foundation). U.S. 2,533,796, Dec. 12. Apparatus for processing plastic by mixing.

EXTRUSION. R. Jongedyk (to Western Electric). U S. 2,533,942, Dec. 12. Extrusion apparatus.

MOLDING. H. J. Rothschild (to Georg Fischer A.G.). U.S. 2,533,-959-60, Dec. 12. Shockless jolting device for molding machines and a control device for lifting pins on molding machines.

ARTIFICIAL LEATHER. M. C. Teague (to U.S. Rubber). U.S. 2,533,976, Dec. 12. A plastic shoe upper material which has properties similar to leather.

ADHESIVE. H. M. Cadot (to Du Pont). U.S. 2,533,994, Dec. 12. Hot-pressed plywood glued with a methoxymethoxyethyl carbamate-modified melamine-formaldehyde condensate.

FIBERS. E. F. Izard (to Du Pont). U.S. 2,534,028, Dec. 12. Process for producing fiber-forming polyethylene terephthalate.

POLYMERIZATION. M. M. Renfrew (to Du Pont). U.S. 2,534,058, Dec. 12. Polymerization of tetrafluoroethylene with dibasic acid peroxide catalysts.

POLYMERS. D. E. Strain (to Du Pont). U. S. 2,534,078, Dec. 12. Heating chlorinated ethylene polymer and chlorosulfonated ethylene polymer to produce a cured insoluble resin.

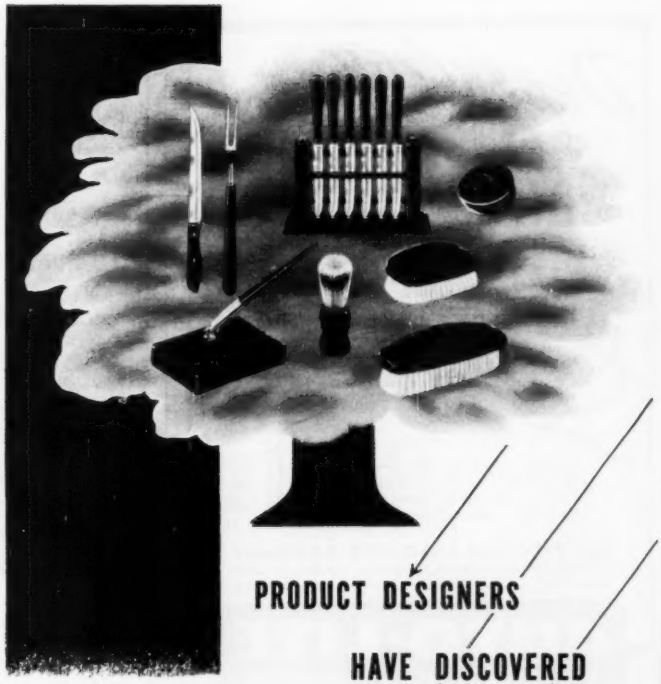
GRANULAR POLYMERS. D. E. Strain (to Du Pont). U.S. 2,534,079, Dec. 12. Producing granular polymeric material by treating a solution thereof with steam.

RESIN. H. A. Walter (to Monsanto). U.S. 2,534,087, Dec. 12. Condensates of 2,5-diamino-1-thiadiazine-3,4 with formaldehyde.

SAFETY GLASS. F. T. Buckley and G. R. Sido (to Monsanto). U.S. 2,-534,102, Dec 12. Laminated safety glass.

COPOLYMERS. W. L. J. De Nie and R. H. M. Meyer (to Shell Development). U.S. 2,534,108, Dec. 12. Process for copolymerizing monomers which have different polymerizing rates.

NONWOVEN FABRIC. L. G. Egger (to United Merchants and Manufac-

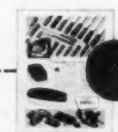


PRODUCT DESIGNERS HAVE DISCOVERED STRATA-WOOD BY FORMICA

Women just simply can't resist Strata-wood's gorgeous natural wood beauty and its incomparably smooth, permanently polished surface! A treated wood produced by Formica, Strata-wood is giving extra added sales appeal to cutlery, compacts, hair brushes and many other style items.

Product designers have gratefully welcomed Strata-wood's additional useful properties: hard and dense throughout, moisture- and grease-resistant, laminated for uniform wood beauty through-and-through, no distortion even after years of hard use . . . plus good machining qualities.

Why don't you discover Strata-wood, too? Send today for your free sample . . . thrill at the pleasant 'feel', admire its exquisite beauty . . . see how it can improve your product! Mail coupon today.



THE FORMICA COMPANY
4531 SPRING GROVE AVE.
CINCINNATI 32, OHIO

Productive FORMICA at Work in Industry

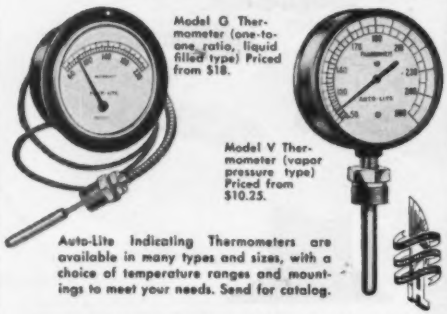
Gentlemen: Please send me immediately my free Strata-wood sample (2-1/2" dia. x 7/16" thick); also your illustrated Strata-wood folder.

NAME _____

COMPANY _____ TITLE _____

ADDRESS _____

Depend on AUTO-LITE
FOR TEMPERATURE INDICATION



Model G Thermometer (one-to-one ratio, liquid filled type) Priced from $18.

Model V Thermometer (vapor pressure type) Priced from $10.25.

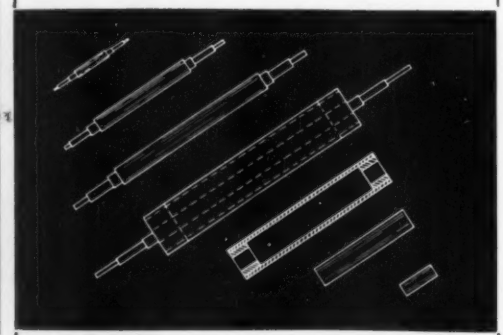
Auto-Lite Indicating Thermometers are available in many types and sizes, with a choice of temperature ranges and mountings to meet your needs. Send for catalog.

THE ELECTRIC AUTO-LITE COMPANY
INSTRUMENT AND GAUGE DIVISION · TOLEDO 1, OHIO
NEW YORK CHICAGO SARNIA, ONTARIO

AUTO-LITE
INDICATING & RECORDING THERMOMETERS

VINYL PRINTING CYLINDERS

- 54" circumference x 60" face steel printing cylinders
- Permanent mandrels inserted or bored to fit your mandrel
- Steel rollers in all sizes
  from 14" circumference x 12" face
  to 74" circumference x 90" face
- These rolls have smooth, polished surfaces, ready for copper plating



LEMBO MACHINE WORKS INC.
248 East 17th St. Paterson, N. J.

Manufacturers of Vinyl Printing Machines
1 to 4 colors—up to 80" wide
Complete specifications and prices on request

turers). U.S. 2,534,112, Dec. 12. Method of making nonwoven resin-bonded fabric.

POLYMERIZATION. S. E. Glick (to Monsanto). U.S. 2,534,120, Dec. 12. Polymerizing styrene with benzoyl peroxide and di-*tert*-butyl peroxide.

MOLDING POWDER. L. A. Lantz, A. Schofield, and E. Spinner (to Calico Printers' Assoc.). U.S. 2,534,136, Dec. 12. Molding powders comprising polyvinyl acetal resins dyed with vat dyes.

POLYSILOXANES. R. O. Sauer (to G.E.). U.S. 2,534,149, Dec. 12. Preparation of organo-substituted polysiloxanes.

COPOLYMERS. W. S. Emerson (to Monsanto). U.S. 2,534,193, Dec. 12. Copolymers of styrene and p-vinylbenzyl compounds.

POLYESTERS. E. M. Filachione, M. L Fein, and C. H. Fisher (to U.S.). U.S. 2,534,255, Dec. 19. Hydroxy polyesters.

SHEET. W. R. Moss (to Eastman Kodak). U.S. 2,534,291, Dec. 19. Process to form thermoplastic sheet.

CALENDERING. M. E. Pike and E. W. Lane (to Eastman Kodak). U.S. 2,534,296, Dec. 19. Apparatus for calendering thermoplastic sheets.

POLYMERS. J. W. Fisher and E. W. Wheatley (to British Celanese). U.S. 2,534,347, Dec. 19. Production of poly-sulfone amide polymers.

POLYMERS. H. D. Noether (to Celanese). U.S. 2,534,366, Dec. 19. Production of polymeric sulfones.

COPOLYMER. G. E. Hulse (to Hercules Powder). U.S. 2,534,447, Dec. 19. Copolymers of isobutylene and an ester derived by esterifying abietyl alcohol and an α, β-ethylenically unsaturated carboxylic acid.

LAMINATE. H. W. Mohrman (to Monsanto). U.S. 2,534,617, Dec. 19. Laminated unidirectional glass fabric and a polyester-vinyl aromatic copolymer.

POLYMERIZATION. J. D. Calfee and R. M. Thomas (to Standard Oil Development). U.S. 2,534,698, Dec. 19. Polymerization of olefins in a fluorinated diluent.

COATING. E. L. Kropa and G. W. Barlow (to American Cyanamid). U.S. 2,534,717, Dec. 19. Coating of polyacrylonitrile and a film-forming base.

SAND MOLD. S. M. Vincent (to Monsanto). U.S. 2,534,743, Dec. 19. Sand core for metal molding containing as binder a reaction product of glycerol, a tall oil vinyl ester, and maleic anhydride.

MOLDED ARTICLES. T. Holzer. U.S. 2,534,908, Dec. 19. Molded articles of commercial waste liquor, animal albumin, and a cellulosic aggregate.

LAMINATE. F. Nagel and B. C. Nash (to Westinghouse). U.S. 2,534,-923, Dec. 19. Laminate of fibrous sheet and an aryl amine-phenol aldehyde copolymer.

VINYL RESINS. H. A. Walter (to Monsanto). U.S. 2,534,936, Dec. 19. Vinyl chloride polymers stabilized with an aliphatic ester of an aryl sulfonic acid.

MOLDING. H. M. Purcell (to H. P. M. Development). U.S. 2,534,988, Dec. 19. Molding method and apparatus.

RESINS. J. T. Stephan (to Monsanto). U.S. 2,535,020, Dec. 19. Plasticized amino-aldehyde resins.

(*Continued on p. 142*)

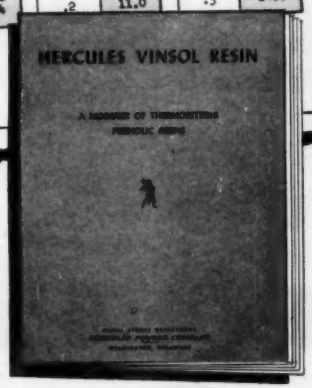
PROOF THAT VINSOL® RESIN CAN

Conserve Scarce Phenolics Without Lowering Quality!

	With Phenolic	With "Vinsol"	With Phenolic	With "Vinsol"	With Phenolic	With "Vinsol"	With Phenolic	With "Vinsol"
Impregnating Solutions								
Phenolic Resin (Based on Solids)	100	50	100	50	100	50	100	50
Vinsol (Based on Solids)	-	50	-	50	-	50	-	50
pH	7.75	6.6	7.75	6.6	7.75	6.6	7.75	6.6
Impregnated Paper								
Drying Time (Minutes at 105°C.)	10	10	10	10	10	10	10	10
Pressing Time (Minutes)	20	20	20	20	20	20	20	20
Pressure (p.s.i.)	1500	1500	1000	1000	750	750	1000	1000
Temperature (°F.) *	350	350	350	350	350	350	275	275
Properties of Cured Kraft Paper Laminate								
Percent Resin Content	49.7	49.3	50.4	50.4	48.8	50.6	48.7	49.8
Flexural Strength (p.s.i.)	18,500	18,300	18,500	16,900	16,300	17,000	16,900	18,900
Flexural Modulus (p.s.i.)	850,000	910,000	870,000	873,000	710,000	760,000	790,000	920,000
Angle of Bend (Degrees)	17	16	16	15	15	17	15	19
Rockwell Hardness (M Scale)	106	114	103	112	64	109	91	115
Specific Gravity	1.31	1.38	1.31	1.37	1.20	1.34	1.28	1.38
Percent Volatile	.76	.32	.66	.32	.95	.31	.70	.80
Percent Water Absorption (24 Hours)**	3.9	3.3	3.3	3.1	8.4	3.4	6.1	3.3
Percent Acetone Extractable	.2	9.9	.3	10.4	.2	11.0	.3	14.6

* Cooled in press.
** Water absorption samples 1/16 inch thick.

Note: All formulations are given as parts by weight.



THIS TABLE shows comparative values of paper laminates in which one of the impregnating solutions was a commercial phenolic varnish and the other a "Vinsol" modification of the commercial phenolic varnish. Any losses in end properties are negligible. "Vinsol" has even improved physical characteristics in some instances. These results are typical of many investigations conducted by Hercules on laminating, molding, and other phenolic formulations.

Today, especially, it will pay you to evaluate "Vinsol" as a phenolic extender or modifier. Priced at less than 5¢ per pound, this dark-colored, high-melting thermoplastic offers substantial savings in total resin costs. Send for generous testing sample.

FREE 24-PAGE BOOKLET

The table shown above is reproduced from this new Hercules booklet. It is one of many which indicate the opportunities that "Vinsol" Resin offers in conserving phenolics in the production and use of phenol-based solutions and molding materials. Write for your copy of this helpful booklet. We will be glad to provide specific technical advice if you'll tell us where you think "Vinsol" could conserve your phenolic supply.

HERCULES POWDER COMPANY 916 Market Street, Wilmington, Delaware
INCORPORATED

NV51-2

MOLD. O. E. Hermanns (to Goodrich). U.S. 2,535,132, Dec. 26. Injection mold.

POLYMERIZATION. G. Benson and R. L. Parks (to Shawinigan). U.S. 2,535,189, Dec. 26. Polymerizing vinyl acetate in granular form.

RESINS. F. J. Sowa. U.S. 2,535,239, Dec. 26. Castor oil-organosilicon reaction products.

MOLDING. G. E. Henning (to Western Electric). U.S. 2,535,286-7, Dec. 26. Apparatus for working and advancing plastic material.

PLASTIC. R. W. Ivett and W. Koch (to Hercules Powder). U.S. 2,535,-290, Dec. 26. Cellulose ethers stabilized with diisobutylphenol.

CELLULOSE ETHERS. W. E. Gloor, G. H. Pyle, W. Koch and A. L. Rummelsberg (to Hercules). U.S. 2,535,-357-9-60-1-2-3, Dec. 26. Stabilizers for cellulose ethers.

MOLDED OBJECTS. H. E. Shearer and A. R. Martin (to American Viscose). U. S. 2,535,373, Dec. 26. Molded objects from fibrous material.

RESIN. K. H. Adams and G. L. Doelling (to Mississippi Valley Research Laboratories). U. S. 2,535,380, Dec. 26. Thermosetting formaldehyde resin modified with polyethylene glycol bis(aminophenyl) ether.

MOLDING. C. E. Maynard (to Prophy-lac-tic Brush). U.S. 2,535,436, Dec. 26. Injection molding process.

RESIN. B. E. Anderson (to Don Gavan). U.S. 2,535,475, Dec. 26. Grinding methylolurea with filler and ethylenediamine.

RESINS. E. M. Evans and H. T. Hookway (to British Resin Products). U.S. 2,535,533-4, Dec. 26. (Polymeric allyl and β-hydrocarbon-substituted allyl derivatives of 1,3,-5-trimethylene trisulfone.

POLYMERIZATION. W. L. Walton (to Hercules Powder). U.S. 2,535,557, Dec. 26. The polymerization of a vinyl compound with a tertiary menthane thiol.

VINYL RESIN SHEET. G. P. Mack (to Advance Solvents). U.S. 2,535,-643, Dec. 26. Process of preparing plasticized vinyl resin sheet.

VINYL COMPOSITIONS. A. F. G. Mouchiroud (to Societe "Rhodiaceta") U.S. 2,535,649, Dec. 26. Polyvinyl compositions of improved resistance to light.

PREHEATING. R. D. Beck (to Continental Can). U.S. 2,535,829, Dec. 26. Apparatus for preheating molding powders.

CURE TESTER. R. D. Beck (to Continental Can). U.S. 2,535,830, Dec. 26. Cure tester for plastics.

ADHESIVE. A. L. Hatfield and H. P. Owen (to Goodrich). U.S. 2,535,852, Dec. 26. Adhesive comprising a rosin alcohol and a butadiene-acrylonitrile copolymer.

COATING. D. Schoenholz and H. Terry. U.S. 2,536,018, Jan. 2. Coating composition for finishing paper containing polyvinyl acetate.

COATING. W. F. Flanagan (to New Wrinkle). U. S. 2,536,049, Jan. 2. Coating containing vinyl chloride-acetate copolymer.

COATED COMPOSITE. C. H. Hempel (to Heresite). U.S. 2,536,056, Jan. 2. Phenolic resin-coated composite.

RESINS. A. E. Rheineck (to Hercules Powder). U.S. 2,536,090-1, Jan. 2. Preparation of pentaerythritol resins compatible with nitro-cellulose.

PROTECT YOUR PRODUCTS DURING SHIPMENT *with*

S·S·White PLASTIC DUMMY SHIPPING PLUGS AND CAPS

HEX. SOCKET TYPE PLUGS FOR N.P.T. PIPE THREADS

PLAIN TYPE PLUGS FOR N.P.T. PIPE THREADS

SHOULDER TYPE PLUGS FOR MACHINE SCREW THREADS

TYPE C CAP NUTS FOR MACHINE SCREW THREADS AND N.P.T. PIPE THREADS

Made of tough, non-brittle plastic. Available from stock molds in a wide range of sizes. Details in *BULLETIN P-4601*. Copy mailed on request

CONTRACT MOLDING *in all standard thermoplastic and thermosetting materials.*

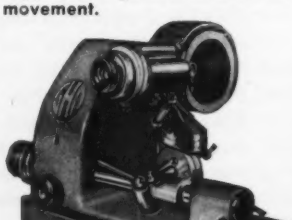
THE S·S·White DENTAL MFG. CO. PLASTICS DIVISION

Dept. M 10 East 40th St. NEW YORK 16, N. Y.

ALEXANDER

UNIVERSAL CUTTER GRINDERS

Grind HSS — Super HSS and CARBIDE TIPPED Engraving Cutters to any pre-determined angle or radius. This Grinder has a Universal Head, Cross-Slide and Micrometer adjustments for feeds and chip clearance. The adjustable grinding arm has a graduated tilting support and graduated collar for vertical or horizontal movement.



CUTTER GRINDERS, CUTTERS, SPINDLES, COLLETS AND SPARE PARTS CARRIED IN NEW YORK STOCK FOR IMMEDIATE DELIVERY.

Send for Catalog describing these Alexander Grinders, Pantograph Engraving and Die Sinking Machines.

J. ARTHUR DEAKIN & SON

182 Sigourney Street Brooklyn 31, N. Y.

Midwest Representative

L. A. Zocchi 615 W. Randolph St., Chicago 6, Ill.

THESE CAN'T BE SUCCESSFULLY IMITATED!

You get better heat-light protection with Advance RESIN STABILIZERS. And experienced plastics men know they can't be successfully imitated!

Over twenty years of know-how, research and carefully controlled manufacture have time-tested and proven Advance VINYL RESIN STABILIZERS' superiority. Process risks are eliminated.

If you have a particular problem, call on us. We're always on hand.

Write for Literature

ADVANCE VINYL RESIN STABILIZERS			
#3	#52	#21	E6B
V-1-N	JCX	VL-3	BC-12
OTHERS PREPARED TO FIT YOUR NEEDS			

ADVANCE SOLVENTS & CHEMICAL CORP.
245 FIFTH AVENUE, NEW YORK 16, N. Y.

This powerful R. D. Wood upmoving hydraulic press gives you the rigidity required for the accurate hobbing of intricate single or multi-cavity molds.

It has a working pressure of 3000 psi, develops 6530 psi through use of a hydraulic intensifier. Capacity is 1000 tons. Platens measure 24" x 30". It is manufactured in various sizes and capacities. Write for information.

HYDRAULIC PRESSES AND VALVES FOR EVERY PURPOSE
ACCUMULATORS [illegible] INTENSIFIERS

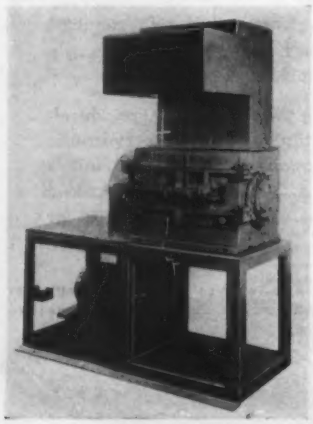
Est. 1803 **R. D. Wood Company**

NEW MACHINERY AND EQUIPMENT

CHILLER FOR MOLDS—Efficient cooling of molds to permit increased production is one of the many functions claimed for the new Flow-Cold Liquid Chiller now being offered by Acme Industries, Inc., 411 Zimmerman St., Jackson, Mich. The unit is completely self-contained and is simple to install, since no refrigerant piping is necessary. Only low pressure liquid and an electrical connection are needed.

To insure correct refrigerant and water velocity, direct expansion shells and tube chillers (with improved head design, tube hole grooving, and tube rolling and baffle construction) are provided on all models. Proper performance is achieved by a combination high and low pressure refrigeration control built into each compressor. Acme's line of chillers is available in six models ranging from 2 to 15 hp.

PREBREAKERS—To meet increased demand for plastic-reducing machines with larger throat openings, two new prebreakers, Models 24 and 32, have been developed by Cumberland Engineering Co., Dept. 1N, Box 216, Providence, R.I. Model 32 has an opening 20 by 32 in., said to be the largest available on any machine of this type; model 24 has an opening 10 by 24 inches.



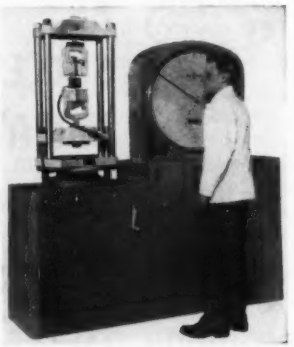
These large openings enable the machines to cut up or break bulky plastic parts which are too large to feed directly into granulating equipment. Plastic material for products as large as radio and T. V. cabinets and tote boxes can be fed into the machine. Each prebreaker has one stationary knife, two rotating knives, and a screen with large holes beneath the rotor.

HOT AIR WELDING GUN—Designed for use in welding plastics is a hot air welding gun made by Almac Engineering Co., P.O. Box 5072, Pittsburgh 6, Pa. The gun can be operated by a compressor or any standard source of compressed air that delivers a pressure of 4 to 5 pounds. Air is carried through the barrel over a self-contained electrical heating unit and is delivered to the tip in required quantity and pressure. The tip temperature of about 350° F., is suitable for economical plastics welding. The gun works on a 110-v., 60-cycle AC. power supply.

PORTABLE LIQUID BLAST CLEANER—Makers and users of tools, dies, fixtures, and molds are being offered a new portable liquid blast cleaning unit designed for occasional work, small parts, and experimental use. Developed by Pangborn Corp., 10 Pangborn Blvd., Hagerstown, Md., and called Number O Type EZ Hydro-Finish Blast Cabinet, the 40-lb. device is also of value to heat treaters and electroplaters. In the plastics field, its principal use is said to be the elimination of much hand polishing, permitting new dies and molds to be hand finished wholly in the soft state before heat treatment and given the final polishing after heat treatment.

Among the major features are: operation from either a ¼-in. compressed air line or any bottle of compressed air; blast chamber 15 in. in diameter; use of a wide range of abrasives (as fine as 5000 mesh); tolerances on blasted parts held to within 0.0001 in.; compact, mobile, and easily handled.

HYDRAULIC TESTING MACHINES—Simplified and accurate tension, compression, transverse, and flexure testing is made possible by a new line of low-cost hydraulic testing machines announced by Tinius Olsen Testing Machine Co., 1068 Easton Rd., Willow Grove, Pa. Designated the Super "L," the machines incorporate a new indicating system which makes possible a 50 to 1 spread of testing ranges on one 28-in. dial. The indicating system is separate from the loading system in



that the load is developed hydraulically and measured and indicated electrically.

Test ranges of the Super "L" series, covering full, one-fifth, and one-fiftieth capacities, can be changed during operation without altering the rate of loading. A range of speeds from 0 to 2 in. per minute is obtainable in stepless intervals. The line is available in capacities of 60,000, 120,000, 200,000, and 300,000 lb. with suitable middle and low ranges.

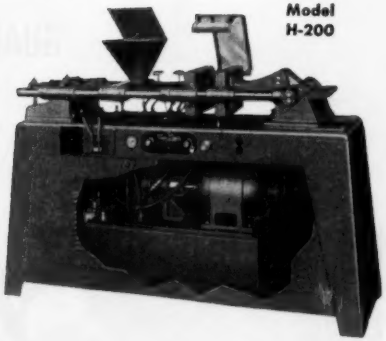
PUNCH PRESS—Several improvements have been made in the 4-ton deep-throat punch press produced by Benchmaster Mfg. Co., 2952 W. Pico Blvd., Los Angeles, Calif. Where open height, ram up, was formerly 6¾ in., the revised model has 8 in., permitting use of higher dies and special tooling. The new press punches to the center of an 18-in. circle. Other changes: frame con-

Model H-200

SEMI-AUTOMATIC INJECTION PRESS

2-oz. capacity. Van Dorn's engineering experience has scored again with this leader among all injection presses of its class. Its ultra-modern design insures faster operating cycles—up to 6 per minute. Push button controls are safe, simple and convenient. Accurate temperature regulation. Ruggedly built, compact and quiet.

Model H-200



Power Operated, Lever Controlled Presses—Available in 2-oz. or 1-oz. models. These profit-makers feature: Rugged all-welded construction; built-in safety devices; heating chamber with ample plasticizing capacity.

VAN DORN

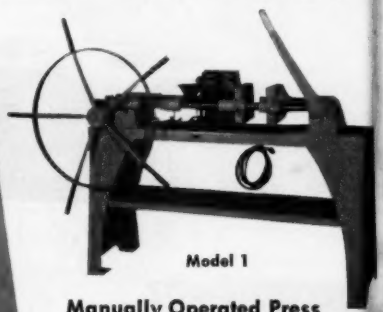
Plastic Equipment

COSTS LESS to Buy...to Operate!

Van Dorn presses are *unexcelled in efficiency* and *unequalled in economy* on the innumerable jobs where a 2-oz. injection is ample. Costwise, Van Dorn presses are outstanding for these reasons:

1. **Surprisingly low in price**
2. **Operate 8 hours for a few dollars**
3. **Use less expensive molds**
4. **Easily set up by one man in a few minutes**

These presses mold practically all thermoplastics including nylon . . . Look over the Van Dorn presses and plastic equipment shown—*then write for detailed Bulletins on individual machines.*

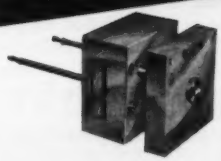


Model 1

Manually Operated Press
1-oz. capacity. Ideal for smaller jobs, experimental work, training.

Plastic Grinder
Grinds up rejects, waste, etc., for re-use. Ruggedly made, easily cleaned.

Model G-100

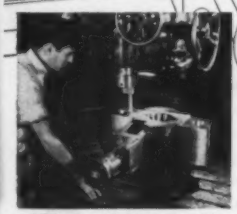


Mold Bases
. . . Available from stock for all Van Dorn presses.

THE Van Dorn IRON WORKS CO.
2687 EAST 79th STREET • CLEVELAND 4, OHIO
Cable Address: "VANDORN" Cleveland

BETTER MOLDS FOR PLASTICS...

GUARANTEE RESULTS



Efficiency and economy result when skilled craftsmen, operating the latest and best machinery available tackle a PARKER mold.

. . . AND THEY COST *LESS* TOO!

A mold for plastic that produces a product that needs polishing, or a product with excessive flash that needs trimming, or plastic parts that lack uniformity and do not fit properly into assemblies, is an EXPENSIVE mold.

An investment in expert design technique, experience and craftsmanship, when buying a mold for plastic, not only saves molding time, production headaches, but pays off in quality molded products. A guarantee of uniformity and accuracy of the finished molded product is built into every Parker mold. Be sure that your plastic products come out "Clean as a Whistle". Investigate Parker's mold making facilities. Remember a *better* mold for plastics guarantees results and *costs less* too!

Write for the PARKER GREEN BOOK TODAY!

THE PARKER STAMP WORKS, INC.
PLASTIC MOLD DIVISION
FRANKLIN AVENUE • HARTFORD, CONNECTICUT

by Parker

struction has been strengthened at all stress points; a knock-out has been added; and all parts, with the exception of the frame, trip link, and legs, have been standardized.

HEAVY-DUTY TOGGLE CLAMP—Locking action said to deliver holding pressures up to 4000 lb., is an important feature of a powerful, heavy-duty plunger-type toggle clamp recently added to the De-Sta-Co line of Detroit Stamping Co., 327 Midland Ave., Detroit 3, Mich. Other specifications include: plunger travel, 3 in., with end tapped for ⅝-in. diameter adjustment bolt; self-feeding lubricator pad on top of plunger to assure proper lubrication; width, 3 in.; height, 4½ in., length, 11¼ in., and weight, 5 lbs. 10 ounces.

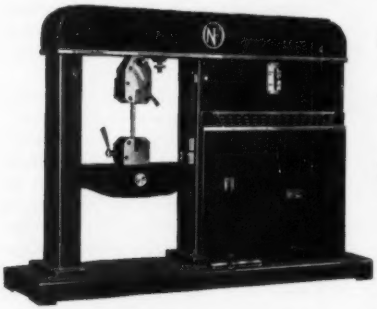
MOLD TEMPERATURE CONTROL—Heating or cooling water to maintain it at a constant temperature while circulating it through passages in a mold is the main purpose of the Model 6002 mold temperature control recently added to its line by Sterling, Inc., 3738 N. Holton St., Milwaukee, Wis. Designed expressly for use in the plastics industry, this self-contained device is a dual unit consisting of two independent heating, cooling, and circulating systems in a single portable unit. It is completely ready to operate when connected to sources of power and water and a drain.

Large immersion heaters are controlled by sensitive thermostats and have plenty of capacity to heat up cold dies without delay, maintain high die temperatures when necessary, and supply sufficient heat to very large dies. Water is circulated rapidly for maximum effectiveness in moving heat into or out of molds. There is no large mass of water to be heated or cooled before desired temperatures are reached, thus permitting quick compensation by the sensitive controls for any changing conditions in the die.

PLASTIC WELDER—Sealing and fabrication of plastics without external heat is accomplished on the model 112 Ectrotherm radio-frequency generator recently introduced by Electronic Processes Corp., 250 N. Market St., San Jose 10, Calif. The equipment provides 4000 to 5000 watts of plate-input power, depend-

In TESTING

DEPENDABILITY-SIMPLICITY-ECONOMY



Model TMU
Only
44 in. High
30,000
or
15,000 lbs.
Capacity

A compact, modern universal testing machine. Tension, compression, flexure tests at A.S.T.M. accuracy. Infinitely-variable speed. Ball bearing pulling screws and nuts give fluid-smooth operation at all speeds. Built for hard service.

Prompt Deliveries of Few Units Remaining in Stock

For Details, Write for Brochure 501

Testing Machine Division

NATIONAL FORGE AND ORDNANCE CO.

Dept. PM, Irvine, Warren County, Penna.

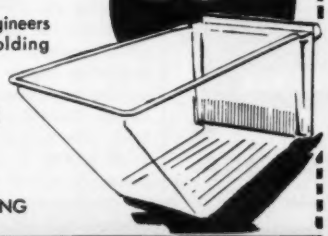
Sinko **has the PLANT-EQUIPMENT-KNOW-HOW—**

Pioneers in Precision Injection Molding

from 4 oz. to 60 oz.

Consult our engineers on all your molding problems.

- ★ METAL-PLASTIC ASSEMBLIES
- ★ PLASTIC PAINTING
- ★ NYLON MOLDING



Sinko MANUFACTURING & TOOL CO.
3135 W. GRAND AVENUE • CHICAGO 22, ILLINOIS

The KEY to Better Plastics

HARFLEX™ PLASTICIZERS

Outstanding for

Low Temperature Performance

Weathering Stability

Long Range
High Temperature Service

HARFLEX PLASTICIZERS

PHTHALATES ADIPATES
HARFLEX 500®
SEBACATES

THE KEY TO HARCHEM BETTER PLASTICS

Canadian Distributor: W. C. Hardesty Co. of Canada Ltd., 1 Wellington St. W., Toronto, Ont.

For information and samples, write

HARDESTY CHEMICAL COMPANY, INC.
41 EAST 42nd ST. NEW YORK 17, N. Y.

MANUFACTURERS OF SEBACIC ACID

PLEASE NOTE -

FLAMBEAU DOES

CUSTOM MOLDING, TOO!

Our facilities are well adapted to handle custom injection molding from design to finishing. All molds are made to your exact specifications. And, because our facilities for custom work are presently not being taxed, we are in a position to apply skill and experience to the immediate solution of your plastics problem, large or small.

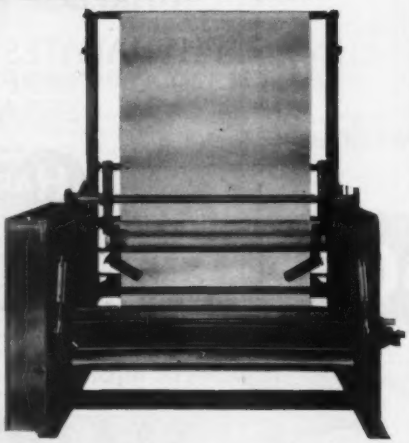
May we hear from you?

fpc

FLAMBEAU PLASTICS CORP.
501 SEVENTH ST. • BARABOO, WIS.

FULLY AUTOMATIC BATCHING OF YOUR PLASTIC FILM

Just load the magazine of the Progressive Automatic Batcher with cardboard tubes and set the desired number of yards per tube on the controls. Then, without requiring additional attention, other than the replenishment of the tube supply, the Automatic Batcher will wind the proper yardage, cut off the film and start winding on a new tube!



Progressive machine co., inc.
Specialists in Plastic Film Handling Equipment
198-202 East 25th Street Paterson 4, N. J.
Tubing Machines • Continuous Hammers & Sealers • Film Cut-Off Reels

ing on the duty cycle. This is claimed to be adequate for single-shot welding of seams up to more than 40 in. long, the length being dependent upon the characteristics of the material in question, as well as complex seams covering extensive areas.

Air-operated Ectrotherm presses of new design are available in two- and three-post types to handle electrodes for both kinds of welds. Rubber shock-mounts are provided for installing presses at convenient working height on top of generators.

Operating features of the generator include: variable tuning inductors with vernier for precise load matching; metering facilities for both grid and plate circuits; r-f traps and line filters; and air filters.

AIR-COOLED BUFF—A pressure-cooled buffing wheel, the Airflow, has been developed by United Buff Products Corp., 233-241 Oak St., Passiac, N.J. The buff, of unit-type metal-center design, requires no additional inserts, fillers, or spacers. Among the merits claimed for Airflow buffing wheels, made of various cloths, are: will not ravel; can be run at higher speeds without burning; and will retain liquid or bar compounds effectively. When used on plastics, it is said to eliminate burning, distortion, flowing, and warpage.

THERMOCOUPLE GLAND—Greater accuracy and quicker response of bare wire thermocouples (without the leakage and expense usually associated with this method of temperature measurement and control of gases, vapors, and liquids) is the objective of a new gland introduced by Conax Sales Co., Inc., 4515 Main St., Buffalo 21, N.Y. Rapid interchangeability of all parts of the gland permits the use of any thermocouple wire, thus making the gland independent of the bare wire.

Sealing the wires by compressing dry powdered talc between two ceramic insulators provides an electric insulation highly resistant to temperature or chemical reaction. The Conax thermocouple gland can be used with temperatures from -100° F. to +1600° F., and will withstand pressures up to 4000 p.s.i. Glands are produced for standard 20-gage thermocouple wires, 14-gage wire, and for use in connection with terminal block or conduit.

FROM *any* ANGLE

PLASTIC SCRAP

POLYSTYRENE · CELLULOSE ACETATE · POLYETHYLENE
ETHYL CELLULOSE · BUTYRATE · VINYL · ACRYLIC

is not *waste!*

We will turn your scrap, obsolete molding powders and rejects into *good* molding powders. Our technical department can serve you . . . from all angles!

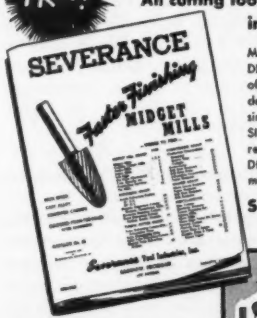
Save money — Save resources

GERING *Products Inc.*

KENILWORTH, N. J.

FREE! **Severance TOOL CATALOG**

All cutting tools are clearly described in this new edition



MIDGET MILLS for faster, better, finishing. DEBURRING CUTTERS for quick deburring of holes, tubes, pipes, rods, etc. Some styles deburr both OD and ID of tube, pipe, etc. simultaneously. CHATTERLESS COUNTERSINKS credited with many top production records. TAPER REAMERS, ELECTRODE DRESSERS, CARBIDE HAND FILES and many other Severance designed tools.

Send for your copy today!

CATALOG No. 18

- **INFORMATIVE**
- **ILLUSTRATED**
- **SUGGESTIVE**
- **DETAILED**

***A helpful tooling guide for* Plant Superintendents, Production Managers, Engineers, Foremen, Purchasing Agents and all others responsible for keeping production tooling costs down.**

SEVERANCE TOOL INDUSTRIES, INC.

638 Iowa Ave., Saginaw, Mich.

IN CANADA: 60 FRONT ST. W., TORONTO

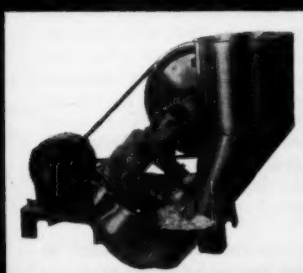
Buttondex

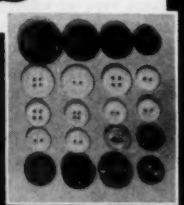
AUTOMATIC BUTTON FINISHER!

saves time!

saves space!

cuts costs!





This compact automatic machine punches fins and cleans holes of Urea, Phenol and Melamine buttons.

- CAN BE SET AND RESET TO HANDLE ALL SIZES
- PRODUCTION UP TO 450 PER MINUTE
- COMES IN 3 SIZES
  - MODEL S ACCEPTS SIZES 12 to 34
  - MODEL SP ACCEPTS SIZES 36 to 50
  - MODEL SX ACCEPTS SIZES 12 to 50

WRITE TODAY for full details!

ButtOndeX CORP.

"Your Problem is Our Product" · 386 Fourth Ave., New York, N.Y.

BOOKS AND BOOKLETS

Write for these publications to the companies listed. Unless otherwise specified, they will be sent gratis to executives who request them on business stationery.

"The Economics of the Printing Ink Industry" by Robert S. Aries and Anthony Nickolous.

Published by R. S. Aries & Associates, 400 Madison Ave., New York 17, N. Y. 108 pages. Price $5.00

Printing inks and their increasing importance in the plastics field—both from a use and application viewpoint—are discussed in this book. The report emphasizes the role of vinyls and nitrocellulose in spirit inks—which are widely used for printing plastic film, metal foils, cellophane sheets, etc.—and describes the use of other plastics for photogravure inks. A list of ink manufacturers, a discussion of manufacturing processes, and the character of various types of inks are other topics considered.

"Printed Circuits" (PB 100 950) by Robert L. Henry.

Published by Office of Technical Services, U. S. Dept. of Commerce, Washington 25, D.C. 99 pages. Price $1.75

Considerable laboratory and industry experience with circuit-printing techniques has accumulated since printed circuits first came into prominence in 1946 with the announcement of their role in the proximity fuse. This report discusses equipment suitable for airborne use, and includes characteristics of special components, materials, and construction details of the final design. A printing press for printing circuits on cylindrical shapes is described.

"Plant Engineering Handbook" by William Staniar, editor-in-chief, and 86 contributing authors.

Published by McGraw-Hill Book Co., 327 West 42nd St., New York 18, N. Y. 1955 pages. Price $15.00

Five years of research have gone into this compendium of industrial know-how which is designed to inform plant managers and engineers on the management, operation, and maintenance of industrial plants, and to present the essentials of good plant engineering practices in 77 major areas of plant operation.

The book deals with industry's consumption and conservation of basic resources, management engineering, industrial construction, fire protection, maintenance, industrial power and its uses, materials handling, and the handling of services. In addition, specialized subjects of instrumentation, bearings and lubrication, and mechanical power are also presented.

"Industrial Research Laboratories of the United States."

Published by National Research Council, 2101 Constitution Ave., Washington 25, D.C. 445 pages. Price $5.00

The ninth edition of this directory contains information on the research laboratories of 2845 industrial and commercial organizations, including the names of the officers, location, numbers and kinds of research scientists and other personnel, fields of research activity, and the size of the laboratory library. Two appendices list government laboratories which cooperate with industry, and universities and colleges which offer research services to industry.

"Handbook of Chemistry and Physics" Editor-in-chief, Charles D. Hodgman.

Published by The Chemical Rubber Co., 2310 Superior Ave., Cleveland 14, Ohio. 2836 pages. Price $7.50.

The 32nd edition of this reference book is broken down into five sections: mathematical tables; properties and physical constants; general chemical tables; physics data; and quantities and units. Rapid development in the field of nuclear physics has necessitated complete revision of isotopic data. Additional revisions cover descriptions of the elements, properties of commercial plastics, organic analytical reagents, surface tension, vapor pressure, and dielectric constants.

Standard samples for spectrochemical analysis—Current information on spectrochemical standard samples is contained in this comprehensive 36-page report, which extends and replaces information given in a similar publication prepared in 1944. Extensive tables list standard samples on iron and steel, aluminum and its alloys, magnesium and its alloys, zinc, lead, and tin alloys. Miscellaneous standard sample include steel-making alloys, ores, and ceramic materials; semi-quantitative standards; synthesized mixtures and solution; and electrode materials. The section on pure materials lists 325 entries supplied by 43 sources; the total number of entries listed is 1077. A copy of this report is available for $1.25 from the *American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa.*

Thermocouples—Complete information and specifications are contained in this 16-page catalog on the firm's thermocouples, protection tubes, thermocouple wire, lead wires, and insulators for all makes of pyrometers. *Arklay S. Richards Co., Inc., 75 Winchester St., Newton Highlands 61, Mass.*

Standard abrasion testing set (Bull. 5003)—The company's precision built instrument designed to evaluate resistance of surfaces to rubbing abrasion is described in this six-page folder. Its range of applications includes tests of painted, lacquered and electroplated surfaces, as well as plastic-coated materials and textile fabrics ranging from sheer silks to heavy upholstery, leather, rubber, and linoleum. *Taber Instrument Corp., 136 Goundry St., N. Tonawanda, N.Y.*

Finishing procedures—All wood, for both interior and exterior use, requires protection against weathering and deterioration. This 10-page brochure outlines finishing procedures for the company's fir plywood, and is divided into four sections: basic information; painting of exteriors; methods of finishing interiors; and finishing of checked surfaces. The text is liberally supplemented with photographs and line drawings. *Douglas Fir Plywood Association, Tacoma 2, Wash.*

Insurok molded and laminated plastics—The company's line of Insurok laminates and molded plastics products is discussed in this four-page booklet. Types of material, fillers, and methods of production are covered, in addition to the firm's production

Drums—"Hard to Beat"

The same Continental fibre drums that serve industry so well are giving an equally good accounting of themselves in military service.

Continental drums give extra protection to dangerous, expensive or hard-to-handle articles for shipment anywhere. Their light tare weight cuts shipping costs. They load compactly and ride safely. The closures are tight and strong, but easy to open and close.

In addition to being rugged and durable, these drums can't be beat for appearance. They are neat and trim and feature quality printing or spray painting.

1. The famous Continental LEVERPAK drum with its unique lever-locking device gives maximum protection under hard usage. 12- to 75-gallon sizes.
2. Continental FIBERPAK drum...a rigid, all-fibre container in ¾- to 67-gallon sizes.
3. Continental STAPAK drum. Has fibre body with metal top and bottom. Supplied in 2- to 35-gallon sizes.
4. Continental UPAK drum. Custom-made for the shipment of rolled materials.

CONTINENTAL CAN COMPANY

FIBRE DRUM DIVISION — VAN WERT, OHIO

NEW YORK • PHILADELPHIA • PITTSBURGH • TONAWANDA • CLEVELAND
CHICAGO • SAN FRANCISCO • ST. LOUIS • LOS ANGELES • EAU CLAIRE

facilities and engineering services. Also included are descriptions of available forms, fabricated parts, gear stock, bearings, and post-formed laminates. *The Richardson Co., 2762 Lake St., Melrose Park, Ill.*

Coloring literature—Three four-page folders on the technique of coloring various types of plastics are now available from this company. The first deals with coloring polyethylene, and the other two deal with the dry coloring of polyester resins and plastisol and organosol resins. *Ferro Enamel Corp., 4150 E. 56th St., Cleveland 5, Ohio.*

Destaticizing styrene articles—Methods of destaticizing styrene articles in production, when on display or in use, are described in this bulletin. The booklet lists permanent and temporary compounds commonly used in minimizing dust pick-up by destaticization. Requirements for a satisfactory destaticizer are outlined. *Plastics Div., Monsanto Chemical Co., Springfield, Mass.*

Fluid power equipment (Bull. 10051)—Complete line of fluid power pumps, motors, transmissions, cylinders, and valves is described in this eight-page bulletin which features small constant and variable delivery pumps, axial piston motors, and an improved line of standard cylinders for pressures up to 1500 p.s.i. The booklet also introduces a standard line of valves and auxiliary equipment for pressure up to 3000 p.s.i. *The Oilgear Co., 1560 W. Pierce St., Milwaukee 4, Wis.*

Geon polyvinyl materials—Properties, applications, compounding, and processing of Geon materials are fully described in this 16-page manual. Particular emphasis is placed on the saleable end products which can be made from the many Geon polyvinyl materials: plastics, resins, polyblends, and latices. *B. F. Goodrich Chemical Co., 324 Rose Building, Cleveland 15, Ohio.*

Condensed catalog (Bull. 299)—A cross section of the company's line of valves which are equally suitable for home and industrial uses is contained in this eight-page booklet. Two completely new valves are described: a fully automatic reseating relief valve, called Tempo; and a large size pressure reducing and regulating valve, type E-41. *A. W. Cash Valve Mfg. Corp., 666 E. Wabash Ave., Decatur 60, Ill.*

The nation's wood supply—Compiled by leaders in the lumber, pulp and paper, plywood, and allied industries, this 24-page booklet points out that for 30 years there has been a definite upward trend in the annual growth of forests and that timber growth is approaching a balance with wood consumption. The brochure cites the "cooperation of public and private agencies in closing the gap between wood removal and wood growth," and lists forest replenishing factors in this country—improved markets for wood, better forest protection, expansion of nursery facilities, scientific developments, and an increasing number of college-trained foresters. *American Forest Products Industries, Inc., 1319 18th St., N.W., Washington 6, D.C.*

Fastener catalog—This latest edition of a handbook for all users of fasteners comprises 100 pages of technical information which includes head and thread dimensions, recommended uses, methods of application, general data, finishes, packaging, weights, and shipping. In addition, the handbook contains the ASA B18.6 standards now in effect. *Continental Screw Co., New Bedford, Mass.*

The story of "Duco" finishes—A pictorial record of the history of a lacquer which revolutionized surface finishing is contained in this 20-page booklet. The origins and development of the lacquer are pictorialized, and its growth over 25 years is traced, along with its impact on various aspects of American business, such as the automobile industry. *E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.*

Plexiglas injection molding powders—Unbalanced or improper molding conditions sometimes affect the finished piece, and it is the purpose of this 12-page booklet to assist molders who are already familiar with the general principles of injection molding in coping with the problems that may arise from these conditions. The specific problems dealt with include mold design, pre-drying the powder, typical molding conditions, purging, and defects in molding techniques with suggested remedies. *Rohm & Haas Co., Washington Square, Philadelphia, Pa.*

High speed synchronous generators—Generators for standby, portable, and prime-source power in ratings from 1.875 to 50 kva with frequencies of 60 and 400 cycles are covered in this four-page bulletin. Four designs are described: externally-regulated, self-regulated, packaged-regulated 4-pole synchronous generators, and high-frequency 14-pole synchronous generators. Product pictures, as well as cut-away and exploded-view photographs, illustrate the text, which enumerates construction features of the new generators and includes a comparison table of ratings. *General Electric Co., Schenectady, N.Y.*

Banbury Mixers (Bull. No. 189)—Up-to-date information about recent improvements in design and construction, new applications, and new installation layouts are contained in this 32-page booklet. General descriptive matter and illustrations of all sizes of Banbury mixers are given, including a table of sizes and capacities, cross-section and cut-away views showing details of construction, and layout drawings of various methods of installation in combination with other machines. The new Uni-Drive Banbury mixers are also covered. They have been developed to take the heavier loads resulting from mixing tougher stocks at higher speeds. *Farrel-Birmingham Co., Inc., Ansonia, Conn.*

Plastic molding presses—This revised 14-page catalog illustrates molding presses with one and two transfer cylinders, semi-automatic presses, self-contained semi-automatic presses, heating and cooling presses, and various other types. It also describes hydraulic pumps, accumulators, valves, and shock alleviators that are manufactured by the company. *Dunning & Boschert Press Co., Inc., 331 W. Water St., Syracuse, N.Y.*

Preservation of the color and shape of flowers (Bull. No. 40)—This booklet, written by R. C. Specht, contains a complete illustrated description of the materials and methods used for preserving live flowers and embedding them in plastic. It is available at

HEAT STABILITY, TOO,

WITH PARAPLEX G-60 PLASTICIZED VINYLS

High heat stability is just one extra feature in vinyl compounds *self-stabilized* with this permanent plasticizer. For PARAPLEX G-60 *stabilizes as it plasticizes*—protects against processing temperatures *and* tough service conditions.

The addition of *as little as 10-20%* of PARAPLEX G-60 cuts stabilizer requirements *as much as 50%*. Use with high ratios of heat-deficient, extender-type plasticizers is also possible. The result? Uniformity of colors, non-yellowing, and excellent light stability on aging and exposure—all at *lower cost*.

Want more? Then add the well-known permanence and non-volatility of PARAPLEX G-60, its low-temperature flexibility, its excellent soap and alkali resistance, and its unusual processing ease. You'll end up with today's top plasticizer buy—PARAPLEX G-60.

SEND FOR LITERATURE AND SAMPLE. **A brief note brings you full details of PARAPLEX G-60 polymeric plasticizer—plus a 1-quart sample. Write today.**

PARAPLEX is a trade-mark, Reg. U. S. Pat. Off. and in principal foreign countries.

CHEMICALS FOR INDUSTRY

ROHM & HAAS COMPANY

THE RESINOUS PRODUCTS DIVISION

Washington Square Philadelphia 5, Pa.

Representatives in principal foreign countries

$1 per copy from *Engineering and Industrial Experiment Station, University of Florida, Gainesville, Fla.*

Corrugated Plexiglas—Nineteen photographic case histories of the use of Plexiglas show how this form of acrylic sheet can be used in interior architecture for homes and offices, in signs and store fronts, in domestic, institutional and commercial lighting, and as glazing for industrial plants. Fabrication techniques listed for this material include cutting, drilling, polishing, and cementing. Also included are the types, colors, sizes, and thickness of Plexiglas sheets, together with a tabulation of physical properties—tensile, flexural, and compressive strengths; specific gravity; impact resistance; modulus of elasticity; coefficient of expansion; thermal conductivity; and recommended service temperatures. *Plastics Dept., Rohm & Haas Co., Washington Sq., Philadelphia 5, Pa.*

Alkyd molding compounds—Bulletins A-3, A-4, A-5, A-6, and A-7 are the first sections of a handbook on alkyd molding compounds now in preparation by the company. A-3, the molding of Plaskon alkyd, contains sections on mold design and construction, equipment, storage and handling, preforming and preheating, and the molding process itself. A-4, properties of Plaskon alkyd 420, includes a data sheet on the granular alkyd molding compound. A-5, Plaskon alkyd 411, supplements A-3 by giving information on the putty-type compound. A-6, properties of Plaskon alkyd 411 (putty) includes a data sheet. A-7, properties and uses of molded Plaskon alkyd, discusses applications of parts molded of both alkyd compounds including detailed information on performance of molded alkyd under varying conditions. *Plaskon Div., Libbey-Owens-Ford Glass Co., Toledo, Ohio.*

Curtains made with Orlon—Designed primarily for retail sales personnel, this four-page folder points up the advantages of using fabrics made of Orlon acrylic fiber for window curtains. The material resists destructive influences which commonly shorten the life of curtains—sunlight, mildew, heat from radiators or hot-air registers, smoke, soot, and industrial fumes. In addition, Orlon offers qualities from a decorative standpoint—it drapes well, has luster, and retains these qualities through its life. *Acetate Div., E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.*

Manual of laboratory safety—The revised edition of this four-page booklet includes recently developed data, techniques, and descriptions of new equipment. Three main sections outline the contents of the manual: how to prevent accidents in the laboratory; laboratory first aid and fire fighting; and safety equipment available for use in laboratories. *Fisher Scientific Co., 717 Forbes St., Pittsburgh, Pa.*

Di-acro precision bending machines—All types of bending equipment manufactured by this company for metal bending are illustrated and described in this 32-page booklet. In addition to describing the company's hand and power operated benders, and showing the work they do, the manual includes sections devoted to mounting of benders, locking fixtures, standard and tube forming accessories, hydra-power bender, rod

Miccrosol

A superior Vinyl Plastisol developed and manufactured to your specifications by MICHIGAN CHROME & CHEMICAL COMPANY.

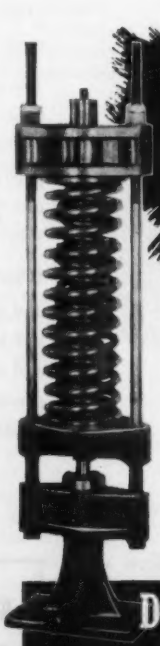
MICCROSOL is specially formulated for a wide variety of coating applications as molding, dipping, etc. It is ideal for slush molding of toys and other suitable flexible objects; as well as a coating material for gloves, fabric, wire goods and packaging protection.

Our engineers will be glad to help you with your molding or coating applications. Write for consultation on your problem.

MICHIGAN CHROME & CHEMICAL COMPANY

6342 East Jefferson Avenue
Detroit 7, Michigan

MICCRO Products



PROTECT Hydraulic Systems from SHOCK

Keep the shock of a quick-closing valve from pounding your hydraulic system to pieces. Avoid unnecessary leaks. Cushion the blow with a Dunning & Boschert Shock Alleviator.

Loosely coiled, nested springs allow a full eight-inch piston travel. Steel tube inside the inner spring prevents buckling. Moving platen is guided by strain rods which are threaded to permit easy adjustment of pressure. Steel cylinder; bronze gland; 2-in. stainless-steel piston.

Here's a sound investment in longer service life—lower maintenance costs. Write for complete information.

Dunning & Boschert PRESS CO., INC.

331 W. WATER ST., SYRACUSE 4, N. Y.

$100 "DE-STA-CO" CLAMP INVESTMENT saves over $5000 each shift per year

Photos courtesy Ross Operating Valve Co. Detroit, Mich.

A saving of 12 man-hours per shift is reported by Ross Operating Valve Company with this fixture, built around 24 "De-Sta-Co" Model #620 Toggle Clamps.

The fixture holds Ross 4-Way air operating valves during a "run-in" operation. The clamp plungers are tipped with rubber grommets which seal exhaust and intake ports during the "run-in," after which the valves are torn down and inspected carefully. Besides the actual saving in man-hours, these "De-Sta-Co" Toggle Clamps convert a tedious setup job into one quickly and accurately performed by less highly-skilled labor.

Plastics fabricators can use setups similar to this fixture for cementing, bonding, or machining of plastics parts. Features making "De-Sta-Co" Toggle Clamps "the answer" for tooling up these operations include

- Rapid toggle action for speedy positioning of work
- Precision construction that assures perfect work alignment
- Low first cost, making possible efficient, inexpensive fixtures
- Wide range of models . . . a type for every application

For *your* problem in production work-holding there's a "De-Sta-Co" Toggle Clamp that assures increased efficiency, accuracy and savings. Whether you're machining, gluing, bonding, inspecting or assembling plastics parts, you do it faster . . . and cheaper . . . with "De-Sta-Co" Toggle Clamps.

Our catalog describes more than 40 fixtures and portable models, holding capacities over 2500 lbs. "De-Sta-Co" template sheets, full and half-scale, speed design of tools and fixtures . . . trace right onto your layout! There's a free set for you, if you're responsible for tool design. Write for your catalog, template kit, and name of nearest "De-Sta-Co" distributor.

DETROIT STAMPING COMPANY
327 MIDLAND AVENUE
DETROIT 3, MICHIGAN

AMPACET

CELLULOSE ACETATE AND ETHYL CELLULOSE

FOR YOUR

DEFENSE ORDERS

As manufacturers of prime thermoplastic molding compounds we are geared to fulfill the most rigid specifications. Also, our large plant facilities enable us to cooperate efficiently with customers' special requirements for storage and drop shipping.

FOR INJECTION MOLDING
FOR EXTRUSION

Available in crystal clear transparent and all colors — transparent, translucent and opaque.

We also custom compound *all* thermoplastics to your specifications.

AMERICAN MOLDING POWDER and CHEMICAL CORP.
AN AFFILIATE OF A. BAMBERGER CORPORATION
703 BEDFORD AVENUE, BROOKLYN 6, N. Y.
Phone: MAin 5-7450 Cable: Chemprod Brooklyn

parter, power parter, and an illustrated outline of the company's machines for duplicating precision parts. *O'Neil-Irwin Mfg. Co., Lake City, Minn.*

Vinylite QG-5900—A new appliance wiring material, which has been listed by Underwriter's Laboratories as an 80° C. insulating material, is covered in this 14-page booklet. The material extrudes with a high gloss and smooth finish so that it is useful even in thin-walled insulation, and its free stripping ability and high linear extrudability qualify it for many applications such as radio hook-up wire, lamp ballast wire, and machinery wiring. The electrical and physical properties of wire insulated with this compound are reported in detail. *Bakelite Div., Union Carbide and Carbon Corp., 30 E. 42nd St., New York 17, N. Y.*

Plastic pipe—The company's plastic pipe, which is said to weigh only 1/13 as much as metal pipe of the same size, is illustrated and described in this eight-page catalog. Information on characteristics, its use in diversified industries, chemical resistance, properties, and so forth, are included. *Johnson Plastic Corp., Chagrin Falls, Ohio.*

Photostat Service

Photostats of articles or parts of articles which have appeared in MODERN PLASTICS magazine may now be obtained on request through MODERN PLASTICS, 575 Madison Ave., New York 22, N.Y. These photostats will be furnished at nominal cost. Estimates on large quantities will be supplied upon request.

Synthetic organic chemicals—The physical and chemical properties, latest specifications, applications, and shipping and handling information on the company's line of chemicals is presented in detail in this 52-page catalog. A water-repellent treatment with Niaproof powder is described; data are also given on acetic acid, sodium acetate, vinyl acetate, acetaldehyde, acetonitrile, and 12 other organic chemicals. The book's cover has a coating of vinyl resin solution derived from vinyl acetate. *Niacet Chemicals Div., U. S. Vanadium Corp. 993 Niagara Bldg., Niagara Falls, N. Y.*

Geon for packaging—Geon polyvinyl materials for packaging applications are described fully in this four-page booklet which contains a complete summary chart of the Geon latices for the packaging field. The outside pages of the booklet are coated with a Geon solution which illustrates the decorative appeal, gloss, and toughness that is obtainable with this material. *B .F. Goodrich Chemical Co., 324 Rose Bldg., Cleveland 15, Ohio.*

Industrial dust control through exhaust systems—Detailed selections, operation, and maintenance data for the plant engineer responsible for dust control are contained in this 50-page digest. Three major sections cover exhaust hoods and piping systems, dust collecting equipment, and exhausters and drives. A detached problem sheet is included on which the engineer may enter specific data pertaining to exhaust problems arising in his plant. *Pangborn Corp., Hagerstown, Md.*

Where "SMALL WORK" GRINDING JOBS are concerned—
DEPEND ON Foredom FLEXIBLE SHAFT MACHINES
for TOP PERFORMANCE VERSATILITY and SPEED!

Quality Tested Since 1922

Model 9050
ONLY $29.60
COMPLETE with 6-STEP FOOT RHEOSTAT and PENCIL-SIZE HANDPIECE

Bench and Hang-Up Models, also models like Model 9030 (*illustrated*) which can be hung up, set on bench or mounted under bench. 5 Handpiece types, pencil-size or larger, all with quick-detachable feature. Extra good flexing qualities provide utmost freedom of movement in handpiece.

Foredoms are profitable additions to all three departments — PRODUCTION, TOOLING and MAINTENANCE.

See Your Industrial Supply Distributor. If he cannot supply you, write to us. Mail coupon for catalog

FOREDOM ELECTRIC CO., Dept. N-3840.
27 Park Place, New York 7, N. Y.

Send your catalog No. 1-3840, showing different uses of Foredom Flexible Shaft Machines.

Name .....
Address .....
City & Zone ..... State .....

THEY GO TOGETHER . . !

Plastics and glass — combined with creative imagination and production skill they form a colorful trio designed to brighten America's luncheon tables and perk up sales for our client, Medco Silver Company of New York.

You'll want to talk with us, if you're considering a job which, like the *Hostess Set* above, calls for low-cost quantity with unvarying high quality. In our shop *they* go together, too.

CONNECTICUT PLASTIC PRODUCTS CO., INC.
70 West Liberty Street, Waterbury, Conn.

Many Light Industries have made a success in...

EL PASO

An ample supply of natural gas and electric power at reasonable rates, plus competent labor of many different kinds, and desirable climate and living conditions are factors that are important in any decision affecting plant location in the plastics industry, as they are in any light manufacturing operation. These factors, and many others besides, are present in El Paso, Texas. General conditions are outlined factually in our new industrial book, and a copy is ready for you upon your request; we will also undertake to develop specific facts that will be helpful to you.

THIS FACT-FILLED BOOK IS YOURS FOR THE ASKING

WRITE:

INDUSTRIAL DEPARTMENT

EL PASO CHAMBER OF COMMERCE

381 SAN FRANCISCO STREET • EL PASO, TEXAS

(EL PASO COUNTY BOARD OF DEVELOPMENT)

THE *Jacques* SLITTER and REWINDER

New Patented Frictions —Micrometer Adjustment. Can use either Contact or Razor-type Cutters. Mill Rolls up to 45" width and 40" diameter. Automatic tension gives better quality work.

HOBBS MANUFACTURING CO.

25 Salisbury St., Worcester 5, Mass.

EST. 1882

Manufacturers of

JACQUES Hand and Power Shears,

TRI-POWER Die Presses, Paper Box Machinery, and

TOUCH-O-MATIC Paper Cutters.

"dag" Concentrated Dispersions of Carbon Black

. . . for coloring polystyrene, polyethylene, ethyl cellulose, cellulose acetate and the vinyls.

Produced either in granular form or as readily extendible pastes, Acheson Concentrated Carbon Black Dispersions yield surfaces possessing high lustre and jetness without the use of toners ...using as little as one-fifth of the ordinary colorant.

They are literally dustless . . . will reduce processing time...minimize product contamination . . . shorten clean-up between runs.

These dispersions for the plastics and coating industries are described in a free booklet. For a copy call or write Acheson Colloids Corporation, Dispersed Pigments Division, 420 Lexington Avenue, New York 17, N. Y.

Acheson Colloids is equipped to do custom disintegrating, dispersing, and stabilizing of solids in a wide variety of vehicles. The dispersing of pigments and dyes to specification is one of our specialties.

Acheson Colloids Corporation

dag DISPERSIONS

WOULD YOU LIKE THESE BOOKLETS FREE?

COLORING OF POLYETHYLENE. Leaflet containing a discussion of the methods and pigments used to color polyethylene materials during molding or extrusion. Ferro Enamel Corp **(4-803)**

SOLKA-FLOC. Folder covering the characteristics of purified cellulose flock for extending and improving the characteristics of thermosetting and thermoplastic resins. Sample included. Brown Co. **(4-809)**

ABRASIVE STONES AND DIAMOND COMPOUND. Folder which tells how D-M-E abrasive stones and diamond compounds can be used to achieve the desired mold finish. Includes price list. Detroit Mold Engineering Co. **(4-814)**

FILM PROCESSING MACHINERY. Extensive discussion of the manufacture, decoration, slitting and winding, and lamination of supported and unsupported plastic films. Contains many machine illustrations and schematic layouts. 20 pages. John Waldron Corp. **(4-835)**

FULLY AUTOMATIC MOLDING PRESS. Description of the Stokes No. 741-A molding press for fully automatic molding of Alkyd and for conventional thermosetting materials. F. J. Stokes Machine Co. **(4-842)**

Any of the booklets described here plus many others—forty-four in all—are available for the asking without charge or obligation.

Just turn to the Manufacturers' Literature page in this issue (it's printed on heavy colored paper), circle the numbers corresponding to the booklets you want, fill in the reply postcard, and mail. No postage needed.

We'll see that you get the literature you request promptly.

A SERVICE OF

MODERN PLASTICS

A BRESKIN PUBLICATION

575 MADISON AVENUE, NEW YORK 22, N. Y.

INTERNATIONAL PLASTICS NEWS*

Activities Around the World of Interest and Importance to the Plastics Industry in the United States

Vinyl plant for Japan—Facilities for the manufacture of Geon polyvinyl chloride will be constructed in Kambara, Japan, by Japanese Geon Co., Ltd., according to a recent announcement by B. F. Goodrich Chemical Co., Cleveland, Ohio.

Formation of Japanese Geon Co. has been approved by the Japanese Foreign Investment Commission and by the Supreme Commander of the Allied Powers. Principal stockholders, in addition to B. F. Goodrich, are The Furukawa Electric Co., Ltd., Nippon Light Metal Co., Ltd., and The Yokahama Rubber Co., Ltd., all of Tokyo.

Engineering design of the new plant and manufacturing techniques will be supplied by Goodrich. Engineers from that company will leave shortly for Tokyo to direct construction and initial operation. The permanent staff of the new plant, however, will be completely Japanese.

Brussels International Fair—In addition to individual foreign exhibitors, a number of foreign governments will participate in the Brussels International Fair, which will be held from April 21 to May 6.

Among the governments scheduled to participate are: Western Germany, Austria, Canada, France, Hungary, Italy, Luxembourg, Switzerland, Czechoslovakia, and Yugoslavia.

Symposium on abrasion and wear—An International Symposium on Abrasion and Wear will be held in Delft, Holland, in November 1951. The meeting is being organized by Rubber-Stichting, Delft, to celebrate the opening of its new building.

The first day of the Symposium will be devoted to the general aspects of Abrasion and Wear, including the problems connected with friction and lubrication. The second day will be devoted to the practical aspects of the abrasion and wear of metals, plastics, rubber, and other materials.

Scientists from various countries will present papers at the Symposium, which will be international in character, in accordance with the international sphere in which the Natural Rubber Producers' Institutes are working. The languages used at the conference will be English and French.

Admittance to the conference will be free of charge, and those interested in attending are requested to apply to the Secretary of the Organizing Committee, Dr. H. C. J. de Decker, P. O. Box 66, Delft, Holland.

Swedish Industries Fair—A variety of products of Swedish industry will be exhibited at the 34th Swedish Industries Fair, which will be held in Gothenburg, May 19 to 27. The object of the Fair is to show what Swedish manufacturers have to offer. Interpreters will be in attendance and business men from outside the country are invited to consider the Fair as an opportunity to establish new connections. Over 160,000 people attended the Fair last year.

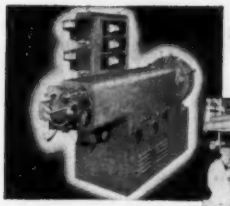
Bowen Prizes—The Council of the British Plastics Federation, as administrator of the Bowen (Cables and Plastics) Prize Fund, will offer prizes of value up to £150 for suitable papers which make scientific contributions in chemistry, physics, engineering, or chemical engineering having a bearing on plastics or polymers. Papers may be submitted to the General Manager of the British Plastics Federation, 47/48 Piccadilly, London, W.1, and must reach him not later than the first post on June 29, 1951.

Display in India—Gering Products, Inc., Kenilworth, N. J., has recently forwarded large three-paneled displays for the promotion of Drycol coloring powder to Calcutta, India. In addition to information about the use of Drycol, the display carries on its panels some finished plastics products molded of crystal styrene colored with the powder.

* Reg. U. S. Pat. Office.

instrumentality in action.....

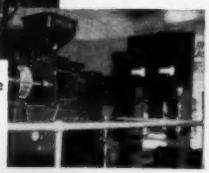
for better plastics



National Rubber Machinery Company

Hydraulic Press Mfg. Company

Lester-Phoenix



Reed-Prentice

Hartig-Engine & Machine

Watson-Stillman

Wheelco Controllers mean better plastics—that's why Wheelco Instrumentality is standard equipment on the leading injection and extrusion machines.

In Plastics, where variation of power input must be controlled, Wheelco Proportioning Control gives you instantaneous, stepless, automatic balancing of heat input against load requirements, thus insuring uniform power and temperature by elimination of over and under shooting.

To assure greater product uniformity—lower rejection rates—reduced costs—make certain your injection and extrusion machines are equipped with the finest controls—specify Wheelco Instrumentality.

Request Bulletin PC on Controllers or Bulletin TC-8 on Sensing Units. Wheelco Instruments Company, 847 W. Harrison Street, Chicago 7, Illinois.

wheelco electronic controls

ORGANIC PEROXIDES

LUPERSOL* DDM

60% METHYL ETHYL KETONE PEROXIDE IN DIMETHYL PHTHALATE

WATER WHITE LIQUID

11% ACTIVE OXYGEN

LOW TEMPERATURE CATALYST FOR POLYESTER RESINS

TECHNICAL DATA AND SAMPLES AVAILABLE UPON REQUEST

*REGISTERED TRADE MARK

TRADE MARK

LUCIDOL DIVISION

NOVADEL-AGENE CORPORATION

BUFFALO 5, NEW YORK

Plastics Molding

for America's LEADING MANUFACTURERS

ALL MATERIALS — ALL METHODS

Northern

40 YEARS OF PLASTIC MOLDING EXPERIENCE

INDUSTRIAL CHEMICAL CO.

11 ELKINS ST., SO. BOSTON, MASS., SOuth 8-4240

BRANCH OFFICES

For the kind of craftmanship that New England is famous for

Depend on SCOTT

Custom Molding

- Injection
- Compression
- Transfer
- Hi-speed Plunger

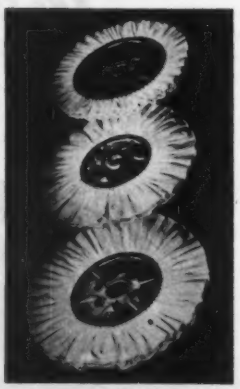
Engineering and Mold Making

The
GEO. S. SCOTT
MFG. CO.
Custom Molders of Plastics Products
WALLINGFORD • CONNECTICUT

Patented buff* finishes any plastic at record speed and low cost

Ten Point Superiority

- reduces time and labor as much as 75% in most cases.
- for acrylics, polystyrene, acetate, nitrate, cast and molded phenolics
- eliminates need for ashing
- eliminates burning, warpage, distortion, flow
- revolutionary "pressure-cooled" metal-center design
- lasts longer, costs less to buy
- used and recommended by leading companies
- needs no inserts, fillers, spacers
- polishes any contour with ease
- provides a perfect finish in a single pass



One buff rough polishes, fine polishes, finishes perfectly.

For complete particulars, write today.

Airflow

UNITED BUFF PRODUCTS corporation
233-241 Oak Street **Passaic, New Jersey**
* Patent No. 2,519,275. Other patents pending.

Production of

FOR the purpose of this report, production is the sum of the quantities of materials produced for consumption in the producing plant, for transfer to other plants

PLASTICS AND SYNTHETIC RESIN PRODUCTION
From Statistics Compiled

Materials	*Total prod'n. 1950*	*Total sales 1950*
CELLULOSE PLASTICS:[a]		
Cellulose acetate and mixed ester plastics:		
Sheets, continuous:		
Under 0.003 gage	12,301,342	12,200,315
0.003 gage and over	10,965,061	11,064,842
All other sheets, rods, and tubes	4,629,254	4,259,016
Molding, extrusion materials	81,898,182	80,007,888
Nitrocellulose:		
Sheets	6,335,972	6,183,663
Rods and tubes	1,360,032	1,197,823
Other cellulose plastics[b]	12,134,311	12,650,982
PHENOLIC AND OTHER TAR ACID RESINS:		
Laminating	72,865,620	50,603,903
Adhesives	30,557,986	28,404,273
Molding materials[c]	220,250,659	196,257,787
Protective coatings (containing less than 10% modifier)	23,081,062	18,356,481
Miscellaneous uses (including casting)	66,705,935	65,180,952
UREA AND MELAMINE RESINS:		
Adhesives	78,875,596	76,476,605
Textile- and paper-treating resins	30,431,568	26,480,333
Protective coatings, modified and unmodified	29,646,281	25,517,981
Miscellaneous uses, including laminating and molding[c]	69,791,504	69,113,232
STYRENE AND STYRENE DERIVATIVE POLYMER AND COPOLYMER RESINS:		
Molding materials[c]	258,739,733	270,224,421
Miscellaneous uses[d]	53,138,700	47,276,378
VINYL RESINS:		
Sheeting and film, including safety-glass sheeting[e]	227,148,533	214,203,292
Adhesive (resin content)	16,307,251	15,125,502
Textile- and paper-treating resins, including spreader and calendering types (resin content)[e]	46,307,251	45,517,489
Molding and extrusion material (resin content)	113,889,368	111,840,521
Miscellaneous uses (resin content)[e]	21,867,828	13,828,277
MISCELLANEOUS SYNTHETIC PLASTICS AND RESIN MATERIALS:		
Molding materials[a, f]	61,748,687	60,361,014
Protective coatings[f]	76,046,330	74,823,310
All other uses[b]	213,893,505	209,276,408

[a] Includes fillers, plasticizers, and extenders. [b] Includes sheets, rods, and tubes, and molding and extrusion materials. [c] Data on resins for laminating and miscellaneous uses are on a dry basis; data on molding materials are on the basis of total weight. [d] Excludes data on protective coating resins; these data are included with miscellaneous coating resins to avoid disclosure of

Plastics Materials

of the same company, and for sale. Sales include only the quantities involved in bona fide sales in which title passes to the purchaser.

IN POUNDS FOR NOVEMBER AND DECEMBER, 1950
by U. S. Tariff Commission

November 1950		*December 1950*	
Production	*Sales*	*Production*	*Sales*
1,150,286	1,070,082	1,224,589	1,132,133
1,108,878	1,138,593	1,148,079	1,057,628
399,559	401,654	438,997	370,900
6,695,726	6,496,440	7,068,699	7,056,614
587,526	604,029	576,890	520,745
118,107	91,122	96,350	117,083
1,069,275	967,882	814,546	871,689
7,332,853	5,269,510	6,629,066	4,722,793
2,344,435	2,601,728	3,655,314	3,712,299
18,801,781	16,637,305	19,120,311	16,831,467
1,787,166	1,483,278	2,281,934	1,664,183
6,049,826	6,306,905	6,821,922	6,390,242
7,299,087	7,305,773	7,088,297	7,510,826
3,870,277	3,767,618	3,206,284	2,981,231
2,581,153	2,271,075	2,630,310	2,186,564
6,432,738	6,687,577	6,883,060	6,868,192
25,798,312	24,626,838	20,336,971	21,912,995
4,312,084	4,006,524	5,061,272	4,334,817
16,682,878	16,410,143	19,337,816	17,396,279
955,124	942,378	593,787	679,290
4,214,627	4,430,951	4,377,325	4,000,877
9,981,227	10,375,404	10,926,354	9,863,147
1,897,073	1,205,257	1,537,115	785,380
5,667,009	5,591,052	6,457,350	5,697,602
7,894,682	7,434,482	8,585,500	7,878,378
19,222,618	18,817,394	20,970,588	20,427,662

operations of individual companies. [a] Includes data for spreader and calendering-type resins. [f] Includes data for acrylic, polyethylene, nylon, and others. [g] Includes data for coumarone-indene, petroleum, silicone, and other protective coating resins. [h] Includes data for acrylic, alkyd, coumarone-indene, nylon, petroleum, silicone, and others for miscellaneous uses. [r] Revised.

the Only PORTABLE ENGRAVER WITH THESE FEATURES

- Engraves 15 sizes from ONE alphabet
- Covers a LARGER area than any other portable
- Equipped with self-centering holding vise
- **Convertible into TRACER GUIDED ELECTRIC ETCHER for identifying tools and dies**

PORTABLE ENGRAVER described in Folder IM20
HEAVY DUTY ENGRAVER described in Folder H20

new hermes, inc.
13-19 UNIVERSITY PLACE • NEW YORK 3, N. Y.
The world's largest manufacturer of portable engraving machines

COTTON FABRICS

FOR
COATING
AND
LAMINATING

★

J.H. LANE & CO., Inc.
250 W. 57th St. • New York, N. Y.

PHENOPREG MATERIALS

for LAMINATING and MOLDING
high pressure • low pressure

IMPREGNATED MATERIALS for LOW PRESSURE APPLICATIONS

PHENOPREG materials, which include resin impregnated fabrics, papers, glass cloth and glass mat, are available for laminating and molding at pressures ranging from contact to 250 psi.

These products have found wide acceptance for molded helmets of various types, aircraft drill jigs, fixtures and structural parts, as well as many other applications.

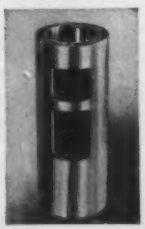
We will develop impregnated materials to meet specific Government specifications or special industrial applications upon request. Die cut preforms are available if desired.

FABRICON PRODUCTS, INC.
PLASTICS DIVISION

Main Office 1721 Pleasant Ave. • River Rouge 18, Mich. • Vinewood 1-8200
Manufacturing Plants: River Rouge, Los Angeles • Sales Offices: New York, Chicago
Canadian Representative: Plastic Supply Company, Montreal, Toronto

Extruders
find Xaloy-lined cylinders
hard to beat

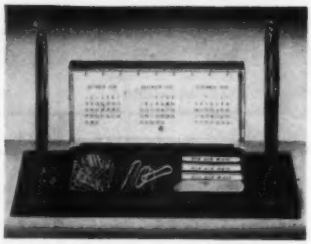
INCREASE YOUR PRODUCTION!
DECREASE YOUR COSTS!



- Xaloy liners are highly resistant to abrasion and corrosion.
- Xaloy minimizes contamination.
- Xaloy reduces friction.
- Xaloy has uniformity of quality.

• SPECIFY XALOY LINERS TO YOUR SUPPLIERS

FOR CORROSION RESISTANCE
FOR ABRASION RESISTANCE
Xaloy
Xaloy 306
INDUSTRIAL RESEARCH LABORATORIES, LTD.
961 EAST SLAUSON AVENUE
LOS ANGELES 11, CALIFORNIA
WRITE FOR ENGINEERING AND PRODUCTION DATA BOOK!



Styrene display container opens into desk stand with accessory compartments

Desk Stand

GIFT boxes can be given a merchandising plus value when they are designed to have permanent usefulness, especially if that usefulness is in connection with the product which they enclose. An outstanding example of such an application is being used by Eversharp, Inc., in its convertible black and gold styrene container whose initial role is to package and display the firm's Desk-Pac fountain pen and pencil set, and which later becomes a desk stand complete with calendar.

Arrow Mfg. Co., Inc., W. New York, N.J., which molds the two-piece box of Dow Styron, created the new design in cooperation with Martin Glaberson, Eversharp's industrial designing chief. Each part is produced in a two-cavity mold. Socket wells, into which the pocket pen and pencil are placed when the set is turned into a desk stand, are molded-in as part of the ebony base. The clear transparent interior, which is gold-sprayed to produce a luxurious color effect, is fluted inside with the Eversharp trade-name molded-in. The lid hinges on a simple pin.

To solve the problem of holding calendar cards, undercuts are molded in the lid, and the calendar cards are die-cut to fit. For display purposes, the box has an attractive velvet pad which can be removed to provide a receptacle for paper clips, stamps, rubber bands, and other sundries.

Mack MOLDS FOR THE LEADERS—

Plastic clamp molded by Mack for Du Mont, manufacturers of television receivers famous for fine performance

When writing, please address inquiries to Department D.

Insure your plastic molding jobs with MACK experience!

DESIGN

MOLD MAKING

MOLDING

Letting MACK figure it in plastics is good business, anytime. At MACK you receive the full benefit of experience that goes back to the early days of the plastics industry. If, on examination of your problem, we feel that the use of plastics is not the proper method, our engineers will so advise you. MACK means sound planning from choice of material and mold design to finishing. That's why a finished job from MACK will pay its way—every time! For complete service, contact Mack Molding Co., Inc., Main Street, Wayne, New Jersey.

THIRTY YEARS

MACK MOLDING IS ONE OF THE ORIGINAL PLASTIC MOLDING SPECIALISTS

Mack MOLDED EXCELLENCE

If you process *Plastics*

SEND FOR THIS BOOKLET

20 PAGES OF DATA ON PRACTICAL PRODUCTION PROCEDURES...

Here's a NEW booklet specially prepared to treat the NEW manufacturing requirements in the rapidly expanding plastics industry. It contains more than 70 diagrammatic sketches and photographs showing the modern processes for handling continuous webs of plastic materials. Among subjects covered are Formation of Supported and Unsupported Plastic Films, Decoration, Laminating, Slitting, Winding, etc.

To get your free copy of this timely and helpful book without any obligation, fill out and mail the handy coupon below.

Dept. M.P.
JOHN WALDRON CORPORATION
P.O. Box 791, New Brunswick, N.J.

Please send my free copy of "Plastic Processing Machinery".

Name _____

Company _____

Street _____

City _____ *Zone* _____ *State* _____

JOHN WALDRON
CORPORATION

Waldron Division — **NEW BRUNSWICK**

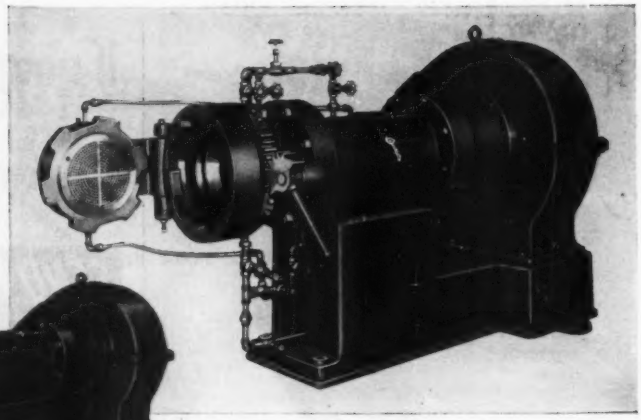
Meadows Division — **NEW JERSEY**

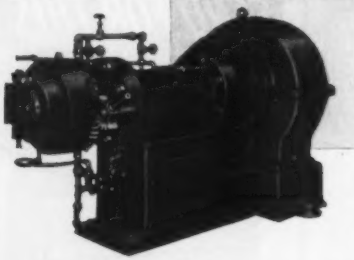
Leaders In Web Process Engineering Since 1827

6" Strainer

WITH SLABBING HEAD

Here is just another of the many examples of National-Erie design . . . the result of nearly a half century in engineering and producing machines for rubber and plastics working. Mechanical features are incorporated in NE strainers which have always resulted in year in year out operation at lowest cost. Let us consult with you on your rubber or plastics machine needs.





ABOVE: 6" strainer with combination slabbing head in open position.

LEFT: 6" strainer with combination slabbing head in closed position.

Complete Rubber and Plastics Working Machinery

NATIONAL ERIE CORPORATION

ERIE, PENNSYLVANIA • U. S. A.

NE

TROUBLE With
Vinyl Stabilization?
Try

STAFLEX® QMXA Stabilizer

- Readily Available
- Free of side reactions
- Free of sulphur discoloration
- Completely compatible

Write Dept. MP for data and samples

DEECY PRODUCTS CO.

PLASTICIZERS STABILIZERS

120 Potter St., Cambridge 42, Mass.

FILLERS

WOOD FLOUR

COTTON FLOCK

of superior quality

CLEANLINESS
LOWEST PRICES
DEPENDABLE SUPPLY
UNIFORM PARTICLE SIZE
CONTROLLED RESIN CONTENT
CONTROLLED MOISTURE CONTENT

from the nation's no. 1 supplier

BECKER, MOORE & CO., INC.

NORTH TONAWANDA • NEW YORK

Courtesy B. F. Goodrich Chemical Co.

Vinyl coat on safety clothing protects worker from injury by inorganic acids

Safety Clothing

ONE of the hazards to personnel in industrial plants—escape of dangerous chemicals from closed or open systems—is being met by a line of protective clothing in which a coating of Geon vinyl chloride resin is used. The clothing, called Gra-Lite, is manufactured by Standard Safety Equipment Co., Chicago, Ill. It is said to afford workers maximum protection against the action of inorganic acids, alkalies, etc.

The outstanding advantage claimed for Gra-Lite clothing is its extreme chemical resistance which is maintained sufficiently long to enable a worker splashed with an injurious chemical to wash himself before damage occurs. Excellent abrasion resistance is another feature. The clothing is colored gray to provide good sunlight reflection. It is light in weight, a pair of Geon-coated overalls, for example, weighing only about 27 ounces.

Gra-Lite's Geon coating has been compounded so that it will not support combustion. It also possesses excellent flexibility at low temperatures and has "armored" seams made by double-stitching lap joints with chemically-resistant thread. The coating of the two pieces being joined is then fused, providing a continuous coated surface covering the seam.

How Leading Plastic Molders

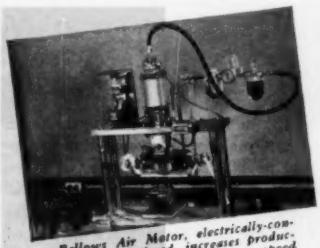
Increase Production

on these 11 FINISHING OPERATIONS

ASSEMBLY
BROACHING
DRILLING
GRINDING
MILLING
MARKING
PUNCHING
ROUTING
SAWING
TAPPING
TURNING

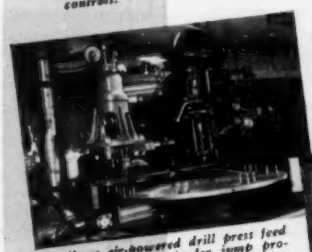
Getting parts to and from a machine is one bottleneck that cuts into machine output. Hand feeding of spindles or other tool holders is a second. Hand clamping of parts into jigs or fixtures is a third.

Plastics molders who apply standard Bellows "Controlled-Air-Power" tool or work feeders, and work holding and clamping devices to their present machines, or who incorporate them in special purpose tool room built machines, report production gains of 25, 50, 75% or more.

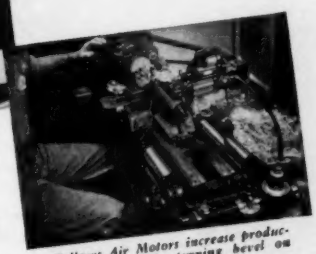


Bellows Air Motor, electrically-controlled and timed, increases production 43% in marking mixer speed controls.

These versatile, inexpensive, easily installed pneumatic power units feed tools with the sensitive touch of a skilled operator; they feed parts quickly and accurately to machines; they clamp and hold parts in position, release and eject them. The machine sets the production pace, yet the elimination of operator fatigue is so pronounced that frequently one operator can run two or more machines.



Bellows air-powered drill press feed and rotary work feeder jump production from 100 to 650 parts per hour in drilling 8 holes in phenolic part.



Bellows Air Motors increase production of lathe in turning bevel on laminated plastic part 71%.

MAY WE SEND YOU

Our latest Foto Fact Files on plastic machining and finishing with pneumatic equipment? Actual case histories sent us by leading plastic fabricators, complete with photographs, wiring diagrams and production data. They're free, on request. Write: The Bellows Co., Dept. MP-451, Akron 9, Ohio.

The Bellows Co.

AKRON 9, OHIO

FASTER, SAFER, BETTER PRODUCTION — WITH "CONTROLLED-AIR-POWER"

Consult Waterbury for MOLDED PLASTICS

Creative Service in Product Development

Research, Design, Engineering
Compression, Transfer, High Speed, Injection and Low Pressure Molding
Over a Century of Fine Tool and Mold Work
Finishing, Assembling

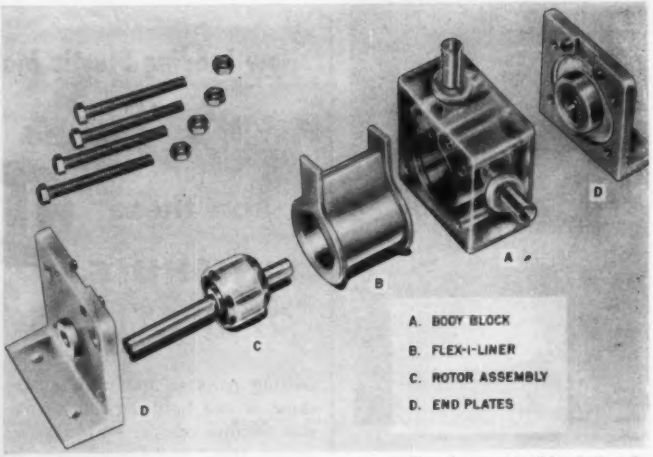
PRODUCERS OF PLASTIC CONTAINERS FOR MANY WORLD FAMED PRODUCTS

SALES OFFICES

NEW YORK 17, N.Y.
17 East 42nd St.
BOSTON 11, MASS.
99 Chauncy St.
CHICAGO 6, ILL.
223 W. Jackson Blvd.
PHILADELPHIA 3, PA.
117 South 17th St.
ROCHESTER 6, N.Y.
Leon W. Sage, Inc.
333 University Ave.
DETROIT 7, MICH.
Wm. Robert Wilson & Associates
6460 Kercheval Ave.

Our technical staff will gladly confer with you.
Write for Waterbury Plastics Catalog "M"

WATERBURY COMPANIES, INC.
Waterbury, Conn.



Illustrations courtesy Rohm & Haas Co.

Main parts of mechanical heart pump (identified by key) are held together by nuts and bolts. Acrylic body block prevents contamination, permits full visibility during surgery

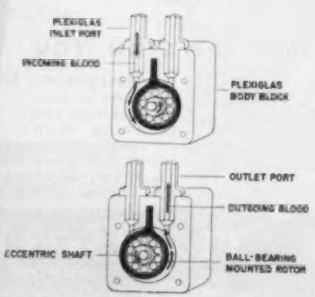
Plastics in a Mechanical Heart

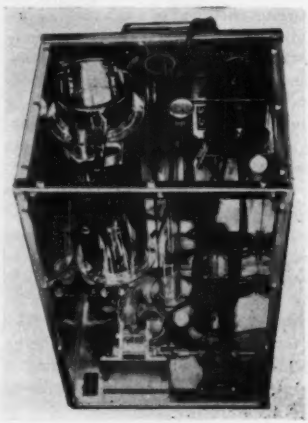
IMPORTANT medical advances have been made possible by the adaptation of the squeegee-action pump to a newly developed mechanical heart, many of whose parts are of plastics. Basic components of the machine are the pump and an artificial lung, both housed in a cabinet of transparent 3/16-in. Plexiglas acrylic.

In use, blood is detoured from the human heart through transparent vinyl tubes into the lung, thence to the Flex-i-liner pump developed by J. J. Ashton Co., and made by Vanton Pump Co., both of New York, N. Y. Key elements of the pump are the body block, made of 2¼-in. Plexiglas II sheet stock; the Flex-i-liner squeegee pressure unit; a rotor; and two end plates. The acrylic block will not contaminate the blood and permits full visibility during an operation.

Although the squeegee pump unit in the heart machine is made of surgical gum rubber, it can be produced from neoprene, Hycar, Buna N, polyethylene, vinyl, or Compar, while the body block can be made of phenolic, polyethylene, or vinyl.

Right: Portable heart-lung machine is housed in acrylic cabinet. Below: Rotation of eccentric shaft develops squeegee action between outer surface of the rotor and inner wall of acrylic block





DRYCOL

DEPENDABLE as your "MIKE"!

DEPENDABILITY saves production time and money, reduces rejects. Only Gering (color specialists from 'way back) could have conceived and produced DRYCOL . . . the dependable dry color powder for in-your-plant use. You specify DRYCOL in any of 17 Bureau of Standards colors; or you order special colors. DRYCOL is dust-free, compact, economical . . . in units to color 50 to 100 lbs. in any mixing drum . . . ready to mold. Send for free sample packet to color 100 lbs.

for Quick, on-the-spot coloring of **all THERMOPLASTICS**

GERING *Products Inc.* KENILWORTH, NEW JERSEY

AT THE RIGHT PLACE—AT THE RIGHT TIME

WITH THE BARKER & DAVIS AUTOMATIC ROTARY CUT-OFF MACHINE

It is the first of its kind used in plastic and rubber extruding machines. Multiple rotary blades cut through the stock and position for the next cut automatically. It is controlled by timer and solenoid activated single revolution clutch—cuts sheets and tubes cleanly and accurately. It will take any desired length up to 30 ft. It is claimed by users that it speeds up production, eliminating one operator and quickly pays for itself.

The timer or cut-off may be purchased separately if desired. Has ½ H.P. motor—weighs 325 lbs.—Timer weight, 50 lbs.

Write for bulletin sheet.

BARKER-DAVIS MACHINE CO., INC.
LEOMINSTER, MASS.

Can you use these

FACILITIES

for low-cost

SPRAYING

- assembly
- fabricating
- hand painting
- silk screening

Make use of the finest assembly facilities available in the East...and save money by doing so. Let Nordan package and drop ship for you... build your models...help develop your products.

17 fully equipped spray booths

13 conveyor belts

40 airbrush and paint specialists

special department for making electro formed spray masks

facilities for defense work

For any plastics assembly job, contact Nordan now

NORDAN PLASTICS CORP.
397 Bridge Street • 26 Front Street
Brooklyn 1, New York

Polyesters are turning up in vital industries more often than ever before . . . as boats, panels, lockers, sleds, armor, airplane fittings, tubing, pipes and a variety of other products.

You who produce these essential items . . . *or may* . . . share our responsibility to go all out to speed manufacturing time, to trim costs, and to use only the latest and most effective production methods available.

Ferro's contribution to the polyester field is COLOR . . . *the successful technique of dry coloring polyester resins* . . . and the ability to accurately match *any* shade of color.

Ferro dry colorants have many advantages over liquid pastes:

- **Cost up to 50% less**
- **Can be added directly during mixing**
- **Will not streak or bleed**
- **Disperse readily**
- **Are easy to clean from equipment**
- **Won't dust or contaminate other materials being run**
- **Are production proved**

Increase your efficiency in polyester production. Mail the coupon below for your free copy of "The Technique of Dry Coloring Polyester Resins" . . . or write FERRO today for help in solving any of your coloring problems.

FERRO ENAMEL CORPORATION
Color Division

FERRO ENAMEL CORPORATION
COLOR DIVISION
4150 E. 56th Street, Cleveland, Ohio

Gentlemen:

Please send me by return mail a free copy of "The Technique of Dry Coloring Polyester Resins".

NAME_____

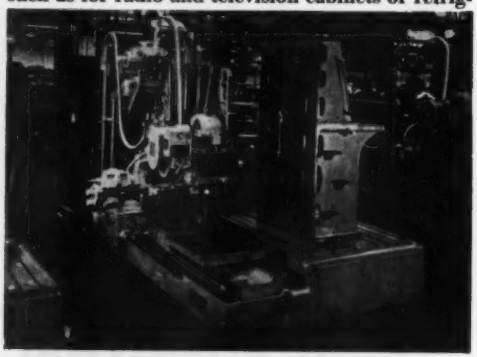
COMPANY_____

STREET_____

CITY_____ STATE_____

NOW WE CAN DUPLICATE
CAVITIES AND CORES
UP TO 36" x 60" x 18" DEEP

One of the largest of its kind, our new Keller duplicating machine enables us to cut huge molds such as for radio and television cabinets or refrig-



eration parts. The shape of the master form is accurately and rapidly reproduced in the new mold through automatic electrical controls.

For estimates on all types of molds, consult the

NEWARK DIE COMPANY
22 SCOTT STREET • NEWARK, NEW JERSEY

SYNTRON
PARTS FEEDERS

Feed Parts

Feeding Rubber Stoppers at 180°

1. Automatically
2. Single File
3. At Variable Rates
4. In Oriented Position

Without damage feed parts . . . small, medium or large . . . wood, metal, fibre, glass or plastic . . . of various shapes . . . to grinders and presses, inspection and packaging devices, and other automatic processing equipment.

Extremely compact, these units operate by controlled electromagnetic vibration—no motors, gears, belts or other wearing parts to require expensive maintenance.

Catalog data upon request. Or send details of your problem along with sample parts to . . .

SYNTRON CO.
390 Lexington Ave. Homer City, Pa.

Washer Impeller

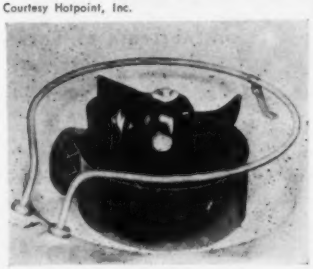
WHEN the automatic electric dishwasher produced by Hotpoint, Inc., an affiliate of General Electric Co., was modified to include a drying cycle, the major design changes were made in the impeller. The unit which was developed is molded of phenolic, measures 5.75 in. in diameter, and weighs 0.6 pounds. It consists of a pair of curved blades for circulating water, plus two vertical vanes for circulating warm air in the drying phase. An opening is molded-in to prevent the formation of a vacuum which would draw water down beneath the impeller.

The surface of the water blades is smooth so as not to retard the pick-up and discharge of water. They are contoured to pick up the water and divert its direction as it travels up the surface of the blades to the point at the top where it is thrown out and upward in an almost vertical direction. This must be done uniformly by both blades to keep vibration and noise at a minimum; as a result of this uniform water discharge, a thorough cleansing is assured. The impeller is produced with the blade thickness held to a 0.006-in. tolerance. In operation, the dishwasher picks up and recirculates 6 qts. of hot water, located in the tub sump, at the rate of 70 gal. per minute.

Extreme tests have proved the impeller's ability to resist the effects of temperature, moisture, acids, or grease. In one severe test, an impeller was boiled in a strong detergent solution for 100 hr., then quenched in ice cold water. At the end of 12 cycles, the part showed no softening, blistering, cracking, change of shape, or loss of gloss.

Blades and vanes of phenolic dishwasher impeller distribute water and air

Courtesy Hotpoint, Inc.



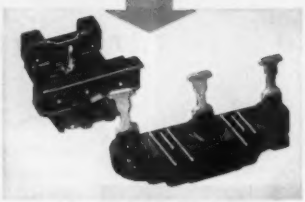
• *From the right plastic . . . by the right process . . . Watertown promises you the perfect product, whatever your specifications might be. Our injection, compression and transfer molding machinery is up to the minute . . . and our laboratory, second to none in the industry, has every testing device to insure development . . . and production, of products, parts or packages that meet the most exacting requirements. In the final analysis, an experienced staff of designers, engineers, chemists and production men . . . working with top-notch equipment . . . remains your best possible assurance of a job well done.*

For the complete plastics job, from idea to delivery, consult . . .

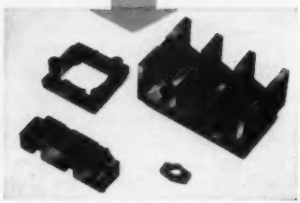
Watertown

WATERTOWN MANUFACTURING COMPANY
100 Echo Lake Road • Watertown, Connecticut

ALLEN BRADLEY... switch-hitters on molding jobs



Stokes 150-ton Plunger Molding Press, and parts (one including inserts) made on this press.



Battery of Stokes Fully Automatic Molding Presses, 15 and 50-ton, and typical parts produced.

When Allen-Bradley of Milwaukee needs parts with adjoining thick and thin sections or parts requiring inserts they use Stokes plunger molding presses.

When they need a volume of smaller parts adapted to automatic production, they switch to fully automatic Stokes machines.

Both these types of Stokes machines have a considerable range of flexibility. You can produce anything on a plunger molding press that you can on a fully automatic but you require a man at each plunger press to load and unload for every cycle. For the parts that require no attention after set-up the fully automatic is ideal . . . one unskilled man can run a dozen or more automatics.

Either of these Stokes machines produces superbly finished quality parts.

Allen-Bradley finds it profitable to have both types. Many manufacturers would profit by the same plan, especially as the Stokes plunger molding press is easily converted to compression molding. Send the coupon to learn the special advantages of switch-hitting in your molding practice.

STOKES MAKES Automatic and Semi-Automatic Molding Presses, Plunger Presses, Closure Presses, Preforming Presses, Industrial Tabletting and Powder Metal Presses, Vacuum and Special Processing Equipment, Water Stills and Special Machinery.

F. J. STOKES MACHINE COMPANY

5934 TABOR ROAD

PHILADELPHIA 20, PA.

F. J. Stokes Machine Co.
5934 Tabor Road
Philadelphia 20, Pa.

☐ *Send me complete information on Stokes Plunger Molding Presses.*

☐ *Send me complete information on Stokes Fully Automatic Presses.*

Name _____ Title _____

Company _____

Address _____

City _____ Zone _____ State _____ DR

Freedom of design is obtained by molding shades of glass fiber, polyester resin

Lamp Shades

MOLDING lamp shades from Fiberglas and polyester resin has introduced an entirely new concept in lamp shade manufacture. By molding shades to shape, and without any support, lamp shade shapes are no longer limited to straight contours. Marplex Co., Los Angeles, Calif., is pioneering this concept with its Fiberglas Bullet shade.

When lamp shades of this type are made from sheet metal, as was customary in the past, they are supported by a wire frame and, unless costly tailoring processes are employed, the shapes are restricted to those having straight sides. Molding the plastic compound under low pressure permits much greater freedom of form. In addition, color possibilities are unlimited, with interesting textural effects resulting from various transparencies.

The Bullet shade, 7½ in. long by 5¼ in. in diameter, is molded in a solid steel mold under a pressure of about 550 p.s.i. and at a temperature of approximately 250° F. No direct preforms are used. The polyester resin, furnished by Pittsburgh Plate Glass Co., Pittsburgh, Pa., Naugatuck Chemical Div., Naugatuck, Conn., and American Cyanamid Co., New York, N.Y., is further compounded and pigmented by the manufacturer.

Mounted integrally on the lamp or fixture, the shade, which is flame-resistant, remains much cooler to the touch than other materials commonly used, and will not scratch, mar, or dent.

AMERICAN "KC" GRINDER . . . in constant use over last 8 years.

PARTS REPLACEMENT COST ONLY $0.11 PER TON (including cost of periodic knife sharpening)

Typical of the many "KC" Grinders now used in plastic moulding plants, the American shown above is *proving* it's *endurance-engineered* for quality performance at minimum cost.

- Wide Hopper takes larger plastic forms without preliminary reduction.
- Accessible for changing or adjusting blades.
- Heavy plate construction, Alloy steel knives, Anti-Friction bearings in dust-tight pillow blocks.
- Capacities to 450 lbs/hr.

Send for *"Grinding Plastics Scrap Profitably"*

American PULVERIZER CO.
Originators and Manufacturers of Ring Crushers and Pulverizers
1117 Macklind Ave.
St. Louis 10, Mo.

M

COMPRESSION
INJECTION
EXTRUSION
FABRICATION

MICHIGAN MOLDED PLASTICS, INC.
Plant and General Offices: DEXTER, MICHIGAN

Sales Offices:			
DETROIT	ELYRIA, OHIO	ST. LOUIS	MOLINE, ILL.
BUFFALO	PHILADELPHIA	MILWAUKEE	SOUTH BEND
	MINNEAPOLIS	CHICAGO	LANSING

brought to Life

by STANLEY VINYL PLASTISOL

Leading doll manufacturers everywhere are making make-believe more exciting to a new generation of little home-makers, thanks to vinyl plastisols created by Stanley chemists especially for slush molding doll parts. These manufacturers know that Stanley plastisols produce dolls that look alive to the touch as well as the eye . . . and, more important, make sales sit up and take notice.

Stanley plastisols are also used to great advantage industrially, for many molded and dipped products where flexibility is required. Stanley plastisols can be formulated for maximum resistance to abrasion, oils, moisture, and chemicals . . . for low temperature flexibility. Find out how your product can be improved by a Stanley vinyl plastisol: write today to the Stanley Chemical Company, East Berlin, Connecticut.

STANLEY Industrial Coatings

STANLEY CHEMICAL

LACQUERS JAPANS SYNTHETICS ENAMELS

Toy Soft Drink Dispenser

A REALISTIC toy—an accurate miniature replica of the familiar Coca-Cola fountain dispenser—is being made of molded styrene by Mac Hay Co., Elgin, Ill.

Three molds are used to produce the various parts; one for the red housing or body; one for the six white parts (including the two-section nozzle and front tray, the back panel, and the front flip door); and one for the miniature Coke glasses and knob for the pull-down handle. All these parts are run on an 8-oz. Reed-Prentice press by Trim Molded Products Co., Burlington, Wis.

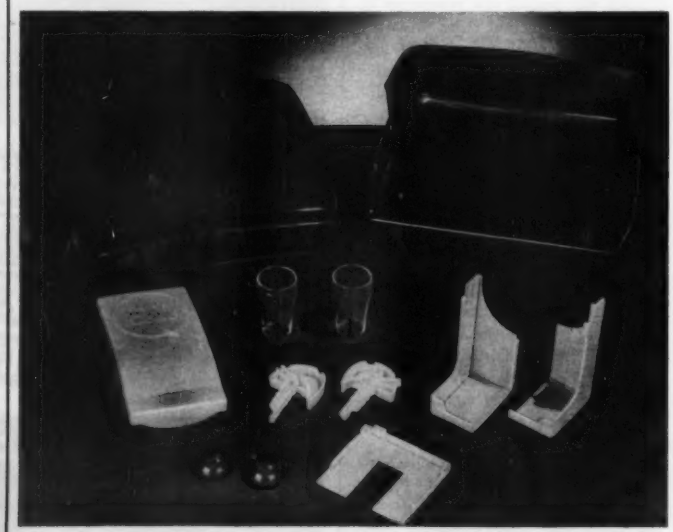
The main housing, made up of two identical halves, and the two halves of the nozzle and tray, are cemented together. Lugs molded into the sides of the body engage holes in the white parts. In assembly, the metal rods on which the flip door and nozzle swing are fitted into bosses molded into the sides of the body.

The soft drink company's famed slogan "Drink Coca-Cola" is molded-in on each side of the housing and painted white, while a red "Have a Coke" in a red circle is molded-in on the rear panel.

Variations in neck sizes of Coke bottles presented a leakage problem which was overcome by molding the neck insert with three stepdown ridges and using a rubber slip-on gasket. The pouring mechanism has an air intake so the liquid will pour without gurgling.

Soft drink pours from bottle inside styrene dispenser when handle is pulled

Youngsters using the toy first uncap a bottle of Coca-Cola, then insert the handle unit, slide the bottle into the dispenser, flip the front door into place, and put a glass in position on the tray. The fountain pours out beverage when the handle is pulled. Each toy comes with clear styrene glasses 2⅛ in. high.



Three molds are used to make dispenser parts which include two-section body; back panel and front flip door; two-part nozzle and front tray; glasses and two-part handle knob

BOOST
80 PSI AIR

(Input Range: 40 to 3000 psi Air or Fluid)

TO . . .
2000 PSI HYDRAULIC PRESSURE

(Output Range: 200 to 10,000 psi Fluid)

with Miller

Fluid Pressure BOOSTERS

From ordinary plant air line pressure, Miller Boosters produce hydraulic pressures (from 200 to 10,000 psi) for driving one or more hydraulic work cylinders simultaneously at from 30 to 450 strokes per minute. Ordinarily, the booster operates one stroke for each stroke of the operated work cylinders.

Used in place of conventional type hydraulic pumps, Miller Boosters save space and weight, permit convenient portability and are easier and less costly to install, operate, and maintain. Also, they hold pressure *indefinitely —without the motion and heat generation of ordinary pump circuits.*

Used in place of air cylinders, the booster driven hydraulic work cylinder, which can do the work of an air cylinder ten times as large and heavy, saves space and weight at point of application of cylinder thrust—since the booster itself can be mounted separately—away from the hydraulic work cylinder—and either on or off the equipment or machine.

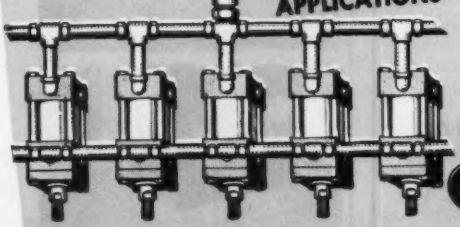
In many installations, the popular Miller Dual Pressure "Air Miser" Booster *saves up to 95% of the air* normally consumed by direct-driven air cylinders.

A wide selection of sizes, pressure ratios and mounting styles are available for the first time at low cost on a normal delivery schedule because Miller Boosters are built up from stock Miller standard cylinder parts to eliminate costly designs, patterns and castings.

Especially Recommended for . . .

- WELDING
- PUNCHING
- SHEARING
- CLAMPING
- RIVETING
- CRIMPING
- PRESSING

and SIMILAR APPLICATIONS



Full Details In Miller Bulletin B-200 Sent FREE On Request

OTHER MILLER PRODUCTS INCLUDE: AIR CYLINDERS, 1½" to 20" BORES, 200 PSI OPERATION; LOW PRESSURE HYDRAULIC CYLINDERS, 1½" TO 6" BORES FOR 500 PSI OPERATION, 8" TO 14" BORES FOR 250 PSI; HIGH PRESSURE HYDRAULIC CYLINDERS, 1½" TO 12" BORES, 2000-3000 PSI OPERATION. ALL MOUNTING STYLES AVAILABLE.

Miller

MILLER MOTOR COMPANY

DEPT. P, 4027 N. KEDZIE AVENUE - - - CHICAGO 18, ILLINOIS

AIR AND HYDRAULIC CYLINDERS · ACCUMULATORS · COUNTERBALANCE CYLINDERS · BOOSTERS · AIR MOTORS

CLEVELAND — PITTSBURGH — PHILADELPHIA — DETROIT — YOUNGSTOWN — BOSTON
HARTFORD — NEW YORK CITY — DAYTON — ST. PAUL — FORT WAYNE — INDIANAPOLIS
MILWAUKEE — NASHVILLE — SEATTLE — LOS ANGELES — SAN FRANCISCO — BALTIMORE
ST. LOUIS and OTHER AREAS.

Sales and Service from coast to coast

REPRINTS

put them to work for you!

Reprints of articles and features that appear in this magazine cost so little that you really should consider using them. Many companies make it a regular practice to have stories which bear on their business reprinted for distribution to sales staffs, customers, prospects and stockholders.

If, at any time, there is or has been something in MODERN PLASTICS which you can use in reprint form, in quantities of 100 copies or more, write and quotations will be furnished promptly.

INDUSTRIAL MAGAZINE SERVICE

An Affiliate of Breskin Publications

575 Madison Avenue New York 22, N. Y.

Photo Copier

HAND copying of printed or written material can be eliminated by use of a new photographic copying device faced with an inflatable cushion of Vinylite film. The purpose of the cushion is to force photographic paper to conform to the contour of material to be copied, even to the pages of a tightly bound book.

The portable kit consists of the cushion, made by Pioneer Valley Plastics Co., Springfield, Mass., and a metal cabinet, which contains the exposure light. The unit is distributed by F. G. Ludwig Associates, Woodbridge, Conn. Vinyl was chosen for the cushion because it resists inks and stains and can be easily cleaned to assure clear copies. The cushion is backed with a rigid sheet of transparent Vinylite to protect glass on the cabinet.

Direct reading negative prints are made from translucent originals, while reverse reading negative prints are made from opaque paper or originals printed on both sides. The latter are read in a mirror attached to the device. For reverses, a piece of sensitized paper is placed on the material to be copied; the device, with cushion inflated, is set on top of this, and the paper is exposed for about 20 seconds. To get a positive print, the negative copy is placed face down on the emulsified side of sensitized paper and exposed for about 20 seconds.

Ink- and stain-resistant inflated vinyl cushion is key to photo copying device
Courtesy Bakelite Co.

10 reasons why your best bet in bearings is TIMKEN®

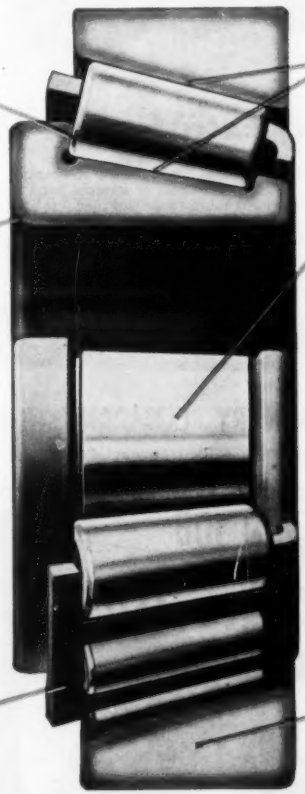
1 *Rib of cone maintains roller alignment, prevents skewing, assures maximum bearing capacity.*

2 *Generous radius permits greater shaft strength.*

3 *Available in 26 different types.*

4 *Precision manufactured. Available with runout tolerance of only seventy-five millionths of an inch (.000075").*

5 *Soft steel cage separates rollers, prevents scuffing.*



6 *Case-hardened surfaces resist wear.*

7 *Micro-inch surface finish makes friction negligible.*

8 *Available in 5850 sizes.*

9 *Made from Timken fine alloy steel for long bearing life.*

10 *Tough inner core resists shock.*

OTHER tapered roller bearings may *look* like Timken® bearings. But there is no other tapered roller bearing which gives you as many important advantages as you get with Timken.

Ten of these advantages are listed above. They all stem from the fact that the Timken Company is the foremost producer of tapered roller bearings and leads in (1) advanced design, (2) precision manufacture, (3) rigid quality control, (4) special analysis steels.

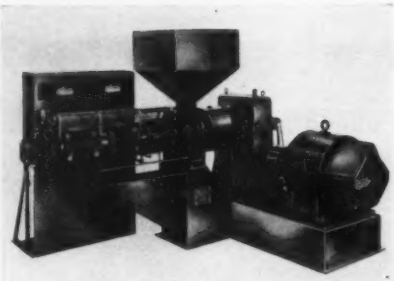
Be sure that every tapered roller bearing *you* use carries the name "Timken", the trade-mark of The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

TIMKEN

TAPERED ROLLER BEARINGS

NOT JUST A BALL NOT JUST A ROLLER THE TIMKEN TAPERED ROLLER BEARING TAKES RADIAL AND THRUST LOADS OR ANY COMBINATION

These are the "SPECS" that Deliver the Goods!



In Davis-Standard Extruders . . .

- enclosed worm gear reduction
- roller thrust and radial bearings
- complete lift-and-gravity lubrication
- separate water-cooled feed throat section
- stainless steel compound storage and feed hopper
- hopper shut-off slide and compound level-indicating window
- electrically heated steel cylinder with Xaloy liner and with Therma-Fin (Pat. Pending) heater-cooler jacket
- alloy steel stock screw with hard-surfaced lands and with complete water-cooling fixtures
- electrically heated quick-opening Stream-Flo cross or straight head
- rugged fabricated steel machine and motor base
- flexible coupling or primary V-belt drive
- complete temperature control consisting of four Wheelco model 252-P proportioning instruments, fuse blocks, contactors, main switch and all wiring from main switch to extruder, all mounted on a neat, shock-absorbing floor panel

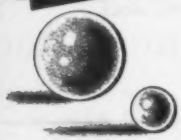
Need we say more?

THE STANDARD MACHINERY COMPANY

MYSTIC Est. 1848 CONN.

✓ ANY FABRICATION JOB

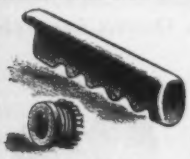
✓ any plastic material see CRYSTAL PLASTICS



Plastic Balls up to 2" diam.

Centerless Grinding of all plastics

Thread Tapping accurate, high speed



Precision Machining to specifications

Vacuum Forming of acrylic plastics

Die Cutting and assembly

for all your requirements, call

CRYSTAL PLASTICS, INC.

232-252 Taaffe Place, Brooklyn 5, N. Y. • Phone: ST 9-4002-4

Vinyl Doll

BIG AS LIFE, a new doll with five parts produced of plastisols based on Vinylite resins appears almost as real as life. The doll, called Judy Splinters, is manufactured by Ideal Novelty & Toy Co., Inc., Long Island City, N.Y., using plastisol compounds furnished by The Watson-Standard Co., Pittsburgh, Pa., and The Stanley Chemical Co., E. Berlin, Conn.

Judy Splinter stands 3 ft. high, approximately the size of a three-year-old child. The head, arms, and legs are slush molded from the plastisol compounds, while the body is cloth. The limbs and head are not hinged, but are securely fastened to the body.

In the assembly process, a wooden block is inserted into the arms and legs just above the elbow and knees. A wire attached to this block is securely tied inside the body, thus making a permanent assembly. The head is fastened on in a similar fashion.

Vinyl plastisols are particularly adaptable to doll production, because the extreme detail (including such realistic characteristics as skin texture—natural patterns and wrinkles—and color tones) which such toys require is easily obtained with these materials. Moreover, plastisol limbs and heads are highly resistant to abrasion, mildew, food acids, moisture, and the severe abuse meted out by young children. Such doll parts will not discolor and are easy to clean.

Realism is the key feature of life-size doll made with plastisol limbs and head

Aircraft

(Continued from pp. 73-78)

der development. Silicone and phenolic laminating resins for use with glass cloth are being worked on. More and better plastic foams for sandwich cores are being developed (a silicone foam material offers most promise at the moment). Owens-Corning Fiberglas Corp. is working on a reinforcing material which is made with continuous fibers drawn parallel and with the resin applied and partially cured. The material has only to be tailored, laid up, and given a final cure to make a finished part.

Plastics in aircraft? There are more now than ever before—and there will be more and more and more.—END

Subscription Order Form

MODERN PLASTICS
575 Madison Avenue, New York 22, N. Y.

Please send me MODERN PLASTICS every month beginning with the.....issue.

One year $5.00 ☐ Two years $8.00 ☐ Three years $10.00 ☐

☐ I Enclose $.....; ☐ Bill me

Name..... Position.....

Company.....

Products manufactured.....

Street.....

City..... Zone..... State.....

Canadian & Foreign Rates: $5.00 one year, $8.00 two years, $10.00 three years.
All subscriptions payable in U. S. Funds or equivalent.

MODERN PLASTICS

ORDER FORM

...ll time THESE 16 INJECTION PRESSES ...E ACTION

...our complete ...ur personnel ...lustry to pro- ...ontract basis.

...le to you are five ... painting and assem- ...e parts . . . including ...olded glas fiber into ...rcial products . . . ... complete service in ...oduction of plastics.

Cambridge first is the ...n fleet of semi-tractor ...peed and expedite de- ...ts to meet today's de- ...ial production time-

★ ★

Fully utilize these complete production facilities and know-how in plastics molding by calling or writing—

C

CAMBRIDGE MOLDED PLASTICS COMPANY

CAMBRIDGE OHIO

E. K. Terry
5-250 General Motors Bldg.
Detroit 2, Michigan
Phone: TRinity 4-1740

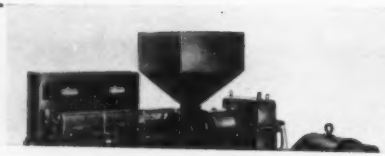
Harry S. Shaffer
Roselawn Center Building
Reading & Section Roads
Cincinnati, Ohio
Phone: JEfferson 6167

Ed Welchmann
737 N. Michigan Avenue
Chicago 11, Illinois
Phone: WHitehall 4-4888

These are the
"SPECS"
that
Deli
th
Goo
In Dc

- enclosed worr
- roller thrust a
- complete lift-a
- separate wate section
- stainless steel feed hopper
- hopper shut-o level-indicatin
- electrically hea Xaloy liner a (Pat. Pending
- alloy steel st surfaced lanc

THE S
MYSTIC



Vinyl Doll

BIG AS LIFE, a new doll with five parts produced of plastisols based on Vinylite resins appears almost as real as life. The doll, called Judy deal and m- n- ed

Postage Will Be Paid by Addressee

No Postage Stamp Necessary If Mailed in the United States

BUSINESS REPLY ENVELOPE
First Class Permit No. 2656 (Sec. 34.9, P. L. & R.), New York, N. Y.

MODERN PLASTICS
575 MADISON AVENUE
NEW YORK 22, N. Y.

Plastic Ba
up to 2" di
of all plastics
accurate, high speed
Precision Machining to specifications
Vacuum Forming of acrylic plastics
Die Cutting and assembly
for all your requirements, call
CRYSTAL PLASTICS, INC.
232-252 Taaffe Place, Brooklyn 5, N. Y. • Phone: ST 9-4002-4

Aircraft

(*Continued from pp. 73-78*)

fairings, waste paper containers, compass housings, and other parts in the B-36.

Bearings—Another type of application in which plastics are playing an increasingly important role is in bearings of various types. For example, the landing gear shock strut in the 180-ton B-36 contains circular bearings machined from Synthane phenolic laminate. Another wide-spread use for phenolic laminates is to prevent electrical wires or hydraulic lines from chafing or wearing where they pass through metal bulkheads or ribs.

The general picture of plastics applications in aircraft is confused by a lack of uniformity throughout the industry. But one thing is clear: the number of applications is constantly growing. Teflon may be used soon in aircraft hydraulic systems. Nylon will no doubt find its applications. There are still innumerable parts being made of metal which would be lighter in weight, less expensive, and as satisfactory or better in performance if made of the proper plastic material. Aircraft manufacturers are aware of this fact and are making use of available plastics as fast as they can without interfering with the flow of defense production.

And while aircraft manufacturers are catching up on the uses for available materials, the plastics industry is increasing the number of possible applications by improving the available materials and developing new ones. A polyester laminate with greater heat resistance is under development. Silicone and phenolic laminating resins for use with glass cloth are being worked on. More and better plastic foams for sandwich cores are being developed (a silicone foam material offers most promise at the moment). Owens-Corning Fiberglas Corp. is working on a reinforcing material which is made with continuous fibers drawn parallel and with the resin applied and partially cured. The material has only to be tailored, laid up, and given a final cure to make a finished part.

Plastics in aircraft? There are more now than ever before—and there will be more and more and more.—END

Attention: THESE 16 INJECTION PRESSES ARE READY FOR DEFENSE ACTION

A corner of the Cambridge Injection Molding Department

Pacing America's industrial effort for defense . . . our complete facilities, along with the know-how and skill of our personnel utilized in the last war, are again fully available to industry to produce quality plastics on a direct contract or sub-contract basis.

Improved Injection Molding Facilities—Our new and improved plastic molding equipment . . . including 60 oz. Injection Molding Machines . . . provides maximum efficiency and quality of products. This, of course, provides the full advantage of centralized purchasing from a single source and substantial savings in cost per molded unit.

Compression Department—To be able to provide a complete plastics molding service to industry, we offer a full compression plastic molding service. This makes possible our ability to produce all industry's molded plastic requirements with the full economies of a concentrated source of supply.

Fabricating—Available to you are five plants specializing in painting and assembly of molded plastic parts . . . including the fabrication of molded glas fiber into defense and commercial products . . . rounding out a truly complete service in all phases of the production of plastics.

Delivery—Another Cambridge first is the operation of our own fleet of semi-tractor trailer trucks that speed and expedite delivery of molded parts to meet today's defense and commercial production timetables.

★ ★ ★

Fully utilize these complete production facilities and know-how in plastics molding by calling or writing—

CAMBRIDGE MOLDED PLASTICS COMPANY

CAMBRIDGE OHIO

E. K. Terry
5-250 General Motors Bldg.
Detroit 2, Michigan
Phone: TRinity 4-1740

Harry S. Shaffer
Roselawn Center Building
Reading & Section Roads
Cincinnati, Ohio
Phone: JEfferson 6167

Ed Weichmann
737 N. Michigan Avenue
Chicago 11, Illinois
Phone: WHitehall 4-4888

HERE AT LAST

A Flame-resistant Thermoplastic

U. S. ROYALITE the sensation of the plastics field

A blow torch that develops tremendous heat is directed on a square of flame-resistant U. S. Royalite.

After being subjected to this intense heat, flame-resistant U. S. Royalite has not sustained combustion.

If you've been waiting for a flame-resistant plastic, it's here . . . it's *U. S. Royalite!* This great material makes possible countless new developments in design and construction, lets plastic fabricators do things never possible before.

Royalite is versatile, light in weight, and more efficient than the materials it replaces. This great thermoplastic can be sawed, sheared, sanded, punched, nailed, bolted, riveted, sewed and cemented. It can be formed on standard equipment with conventional techniques.

ROYALITE IS

- ★ Flame-resistant
- ★ Lightweight
- ★ Unbreakable, non-splintering
- ★ Non-warping, non-corrosive
- ★ Waterproof, stainproof
- ★ Not affected by oils, most acids, alkalies
- ★ Comes in different colors

SEE NEXT PAGE FOR LIST OF U. S. ROYALITE FABRICATORS

u.s. Royalite
STANDARD OR FLAME RESISTANT

UNITED STATES RUBBER COMPANY

2638 NORTH PULASKI ROAD • CHICAGO 39, ILLINOIS

u.s. Royalite

CONSULT THESE EXPERIENCED FABRICATORS OF ROYALITE

CALIFORNIA
Artisan Engineering & Mfg. Co., Inc.
5037 W. Jefferson Blvd., Los Angeles 16
Horace L. Blackman Co., 287 So. Robertson Blvd., Beverly Hills
Engineering Plastics Co., 1475 El Mirador Dr., Pasadena 3
National Plastics Industries, 425 Divisadero St., San Francisco
Swedlow Plastics Co., 5527 District Blvd., Los Angeles 22
Technical Reproductions, 5526 Cleon St., N. Hollywood

COLORADO
Pikes Peak Plastic, 5 W. Cucharras St., Colorado Springs
Plasticraft Co., 2806 N. Speer Blvd., Denver

CONNECTICUT
Colt's Mfg., Hartford 15

FLORIDA
Plastics Design & Mfg. Company, Box 61, Tallahassee

GEORGIA
Gladwin Plastics, 542 Courtland St. N. E., Atlanta

ILLINOIS
Arrem Plastic, 1539 N. Throop St., Chicago 22
Associated Plastics Fabricators, 164 N. May St., Chicago 7
J. B. Carroll Company, cor. Carroll and Albany Aves., Chicago
Cortland Industries, Inc., 4545 W. Cortland St., Chicago 39
Neo Products Co., 2534-38 S. Kedzie Ave., Chicago 23
O-Lin Products, 3755 Kedzie Ave., Chicago 18
Precision Plastic Products Inc., 628 W. Lake St., Chicago 6

INDIANA
General Plastics Corp., 1400 N. Washington, Marion

MARYLAND
Fawn Plastics Co., 2902 Hamilton Ave., Baltimore 14

MICHIGAN
Cadillac Plastic Co., 651 W. Baltimore, Detroit 2
Fabri-Kal, 242 East Kalamazoo Ave., Kalamazoo
Imperial Industries, 4435 Walker Ave., Wayne
Klise Mfg. Co., 50 Cottage Grove S.W., Grand Rapids 2
Reynolds Plastics, Inc., 3445 W. Forth St., Detroit
Woodall Industries Inc., 7565 E. McNichols Rd., Detroit 34

MINNESOTA
T. O. Plastics, 58th & Longfellow, Minneapolis
Plastics, Inc., Chestnut & Ryan Sts., St. Paul 2

MISSOURI
Regal Plastics Co., 710 Main St., Kansas City

NEBRASKA
Omaha Plastics Co., 1470 S. 16th St., Omaha 9

NEW JERSEY
Silleocks-Miller Co., 10 W. Parker Ave., Maplewood
Stokes Molded Products, Inc., Taylor St. at Webster, Trenton 4
Thermacote Co., 320 Jefferson St., Newark 5
Van Beek Industries, 23 Park St., Orange

NEW YORK
Bassons Molded Products, 1424 W. Farms Rd., New York 60
Curbell Inc., 1700 Elmwood Ave., Buffalo 7
Dual Fabricators Corp., 808 Driggs Ave., Brooklyn 11
Dura Plastics Inc., 1 W. 34th St., New York 1
Durable Formed Products, Inc., 329 Canal St., New York 13
Mastercraft Plastics Co., Inc., 95-32 150th St., Jamaica 4
Steiner Plastics Mfg. Co., 47-30 33rd St., Long Island City 1

OHIO
Fabri-Form Co., Box 36, Cambridge
The Baxter Company, 15 E. 2nd St., Cincinnati

PENNSYLVANIA
Halsen Mfg. Co., 5919 Webster St., Philadelphia
Lee Plastics, A and Lippincott St., Philadelphia 34
Pearson-Berlinghof, Inc., 18 North State St., Newton
The Bell Plastics Co., Inc., 600 Heinz St., Pittsburgh 12

TENNESSEE
Plasti-Line, Inc., Jacksboro & Broadway, Knoxville 18

TEXAS
Plastic Engineering Co., 2101 69th St., Houston 11
Plastic Products of Texas, 3319 Love Field Dr., Dallas

WASHINGTON
K. B. Plastics, Inc., 1817 So. 1st St., Yakima
Mason Plastics Company, 1121 Westlake North, Seattle

WISCONSIN
Midland Plastics, Inc., 227 N. Water St., Milwaukee 2

The United States Rubber Company at 2638 North Pulaski Road, Chicago, Illinois, has complete Engineering, Designing, and Styling Departments to assist fabricators on the technique to employ, and in the art of fabricating most efficiently with ROYALITE.

TRY

TUMB-L-MATIC

PROCESSES

FOR LOW-COST FINISHING *automatically!*

Now you can get an exceptionally fine finish on plastics at unbelievably low cost with the revolutionary, new TUMB-L-MATIC PROCESSES. Combined in this economical method of definning, cutting, smoothing and polishing plastics are important new developments in automatic finishing, and TUMB-L-MATIC'S years of experience in scientifically applying equipment, compounds, supplies and techniques to a wide range of products.

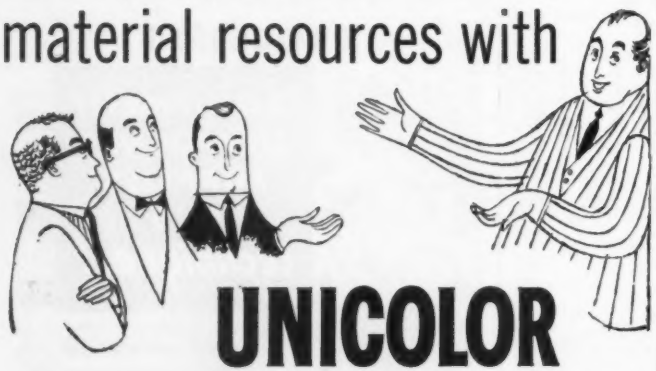
Try It Before You Buy It!

Our experienced engineers analyze a sample (or detailed description) of your product, recommend an individualized, low-cost TUMB-L-MATIC PROCESS complete with production data which enables you to figure finishing costs before you invest a cent. Write and tell us about your product—or better still, send a sample.

AND REMEMBER, TUMB-L-MATIC makes *the complete line* of tumbling and burnishing equipment, compounds and supplies.

TUMB-L-MATIC, INC.
FORMERLY LUPOMATIC INDUSTRIES, INC.
4510 BULLARD AVE. • NEW YORK 70, N. Y. 5695

how you can husband your material resources with



UNICOLOR

If you can cut costs by 3¢, 4¢, or 5½¢ a pound; if you can cut inventory costs; if you can prevent inventory losses; if you can prevent production delays; if you can increase molding equipment capacity —would that improve your corporate balance sheet? Then read these simple questions and answers about the revolutionary resin color concentrate, Unicolor:

Q. How does Unicolor work?

A. Unicolor comes to you in granular or pellet form. It forms a molecular bond with the thermoplastic you use; it fuses and combines with it into a molecular blend that distributes the color uniformly throughout the mass.

Q. Are special skills, special machinery needed?

A. No. Any operator can mix Unicolor without special equipment or special know-how. Coloring and molding are simultaneous. No more material need be prepared than a specific job calls for. One simple weighing, and you get the correct proportion of pigment to uncolored resin. (1 part Unicolor to 24 uncolored resins for electrical insulation and general purpose extrusion; 1 part Unicolor to 6 parts uncolored for injection molding; proportions of specially compounded Unicolor to uncolored vary for streak-free thin film.)

Q. Does Unicolor create new production problems?

A. No. Unicolor does not affect the physical or chemical properties of the plastic it is used with; it does not interfere with normal extrusion rates; it does not produce blemishes or blisters; it does not mottle or streak or bleed. Unlike dry powders, it does not fly and contaminate other machines. It cannot clog screens.

Q. What about my special problems?

A. We are custom compounders, and can handle any special problem immediately and efficiently. A wide range of popular, standard NEMA colors are available for immediate delivery, but special colors can be scientifically matched, quickly compounded and delivered. An informative folder detailing the facts on costs savings, method of handling special color problems, and the simplicity of plant handling of Unicolor, is yours on request.

WESTCHESTER PLASTICS

WESTCHESTER PLASTICS INC.

MAMARONECK, NEW YORK

Custom Compounders of Thermoplastic Materials

Photo Study

(*Continued from pp.* 117-124)

different value of the constant in front. However, the difference becomes apparent when surface lubricant is added to the polymer granules. If the cylinder wall is hot, little effect on the filling time will be noted. On the other hand, if the cylinder wall is cool, the lubricant will act to lower the coefficient of friction, μ, between polymer and wall. This, in turn, will appreciably lower the filling time.

The flow of polymer into the mold is not always as uniform as indicated in Fig. 2. When the gate is relatively small and/or the speed of injection is too high, a phenomenon occurs which we have designated "jetting." This is illustrated in Fig. 3. The excessive kinetic energy of the first polymer through the gate causes it to shoot out into the mold cavity in the form of a jet. This jet is spiraled and kinked in appearance, much like the filaments extruded at high speeds that were described by Spencer and Dillon[5].

The jet continues, as in the first five frames of Fig. 3, until it contacts enough of the mold surface to impede seriously the further progress of the jet. Filling then proceeds in the more usual manner, around the polymer already in the cavity. In the case of quite small gates and large mold cavities, jetting may result in quite a sizeable "ball of yarn" formation before filling proceeds. If filling then proceeds too slowly, the jetted filaments will have cooled too much against the mold walls, and imperfect welds with the incoming hot polymer will result. This leads to a rather characteristic type of surface blemish, a condition which may be correlated with rate of injection.

Another phenomenon occurring during the filling of some cavities is the formation of weld lines. The presence of a weld line in injection moldings often poses a difficult problem, if not from a strength standpoint, certainly from an appearance standpoint. To produce a weld line and observe its formation in the photo mold, small inserts were placed in the center of the cavity

(*Continued on* p. 183)

[5] R. S. Spencer and R. E. Dillon, "Viscous flow of molten polystyrene. II", J. Colloid Science *4*, 241 (1949).

• MANUFACTURERS' LITERATURE •

To obtain any of the booklets or catalogs listed below, simply circle the corresponding number on the post card, fill in the information requested, and mail.

MOLDING MACHINES. Several injection-compression, plunger, transfer, and injection molding machines of various capacities from 1½ to 80 oz. are described. Four-page bulletin. Improved Paper Machinery Corp. **(4-800)**

LABORATORY MILL. Features and specifications of a mill for producing laboratory-size batches of plastic materials and natural rubber. Four pages. Erie Engine and Manufacturing Co. **(4-801)**

MOLD TEMPERATURE CONTROL. Booklet describing the workings and advantages of the Thermolator for maintaining precise temperatures in molds and cores. 12 pages. Industrial Mfg. Corp. **(4-802)**

COLORING OF POLYETHYLENE. Leaflet containing a discussion of the methods and pigments used to color polyethylene materials during molding or extrusion. Ferro Enamel Corp. **(4-803)**

SLITTING AND MANGLING MACHINE. Information on the operation and applications of the Cumberland slitting and mangling machine, available with either two or four blades. Four pages. Illustrated. Cumberland Engineering Co., Inc. **(4-804)**

LACQUER FOR STYRENE. Question and answer leaflet on New England gloss lacquers for finishing styrene. New England Lacquer Co. **(4-805)**

INJECTION MACHINE. Descriptive folder on the 4-oz. MacRay injection machine for molding pieces with large projected areas. MacRay Engineering Co. **(4-806)**

VISCOMETER ADAPTER. Data sheet and discussion on a special attachment for the Brookfield Viscometer that makes possible extremely precise measurements in ultra-low viscosity ranges. Brookfield Engineering Laboratories, Inc. **(4-807)**

SYNTHETIC POLYMER COATING EMULSION. Data sheet covering the characteristics of Polyco 350, a synthetic latex for use in paper coating, laminants and saturants, and as a reinforcing agent for other synthetic latices. American Polymer Corp. **(4-808)**

SOLKA-FLOC. Folder covering the characteristics of purified cellulose flock for extending and improving the characteristics of thermosetting and thermoplastic resins. Sample included. Brown Co. **(4-809)**

WORK GLOVES. Descriptive folder on heavy-duty, light-duty, and gauntlet-style heat-resistant work gloves made of flexible flame-resistant cloth. C. Walker Jones Co. **(4-810)**

JIG BORER. Twelve-page booklet containing a complete description of the Pratt & Whitney No. 4E jig borer, the largest-capacity jig borer built. Pratt & Whitney Div., Niles-Bement-Pond Co. **(4-811)**

ROLLER MILLS AND MIXERS. Detailed information on Day roller mills and mixers. Illustrations, specifications, features, advantages, etc., are given. 20 pages. The J. H. Day Co. **(4-812)**

CYLINDRICAL BAND HEATERS. Description and price list of narrow band cylindrical heaters for applications where heat is to be applied to the outside of cylindrical surfaces. Watlow Electric Manufacturing Co. **(4-813)**

ABRASIVE STONES AND DIAMOND COMPOUND. Folder which tells how D-M-E abrasive stones and diamond compounds can be used to achieve the desired mold finish. Includes price list. Detroit Mold Engineering Co. **(4-814)**

ACRYLIC PEARL. The composition, types, properties, colors, uses, and available sizes of Acryvin's acrylic pearl, which simulates ocean pearl, are given. Acryvin Corp. of America. **(4-815)**

ANTI-STATICS. Folder containing data on two Merix compounds for removing static electricity charges from plastic and other surfaces. Merix Chemical Co. **(4-816)**

INJECTION MOLDING MACHINE. Details and specifications on the R. H. Windsor S. H. 16/20 injection molding machine with automatic time cycle control. R. H. Windsor Ltd. **(4-817)**

PLIO-TUF. Four-page technical bulletin containing data on preparation, compounding, curing, and working characteristics of Plio-Tuf, a high impact-resistant material consisting of high styrene copolymer resins plasticized with small amounts of rubber. The Goodyear Tire & Rubber Co. **(4-818)**

PARCEL POST SCALE. The Detecto Post-O-Meter, used for automatically determining postage for surface and air parcel post, is illustrated and described. Four pages. Detecto Scales, Inc. **(4-819)**

HORIZONTAL CALENDER. Ad reprint containing the features of a new calender specially designed for the product of floor tile. Adamson United Co. **(4-820)**

MACHINE TOOLS. General catalog containing descriptions and specifications of machines for milling, broaching, grinding, flame hardening, and cutter sharpening. 48 pages. Cincinnati Milling & Grinding Machines, Inc. **(4-821)**

MANUFACTURERS' LITERATURE DEPARTMENT
MODERN PLASTICS

I am interested in the following items:

4-800 4-801 4-802 4-803 4-804 4-805 4-806 4-807 4-808 4-809 4-810
4-811 4-812 4-813 4-814 4-815 4-816 4-817 4-818 4-819 4-820 4-821
4-822 4-823 4-824 4-825 4-826 4-827 4-828 4-829 4-830 4-831 4-832
4-833 4-834 4-835 4-836 4-837 4-838 4-839 4-840 4-841 4-842 4-843

If you do not now subscribe to MODERN PLASTICS, but wish to receive the next 12 issues ($5 everywhere), just check here ☐

NAME ..... POSITION .....
(Please Print Plainly)

COMPANY .....

STREET ..... CITY ..... STATE .....

(Not valid after July 1, 1951)

• MANUFACTURERS' LITERATURE •

To obtain any of the booklets or catalogs listed below, simply circle the corresponding number on the post card, fill in the information requested, and mail.

HEAT-RESISTANT ACRYLIC. Five-page bulletin presenting tested information on the properties and behavior of Plexiglas II, heat-resistant cast acrylic sheet. Includes recommendations on mold design, fabricating and forming techniques. Rohm & Haas Co. **(4-822)**

STYRENE ADHESIVE. Thorough discussion of Koppers adhesive for styrene and all phases of its use and how it works. Nine pages. Koppers Co., Inc. **(4-823)**

BANBURY MIXERS. Thirty-two-page booklet containing general descriptive material on Banbury mixers of all sizes. Includes table of capacities, cross section views and layout drawings. Farrel-Birmingham Co., Inc. **(4-824)**

DRY COLOR PIGMENTS FOR PLASTICS AND RUBBER. A list of the available Drakenfeld inorganic pigments including their specific gravities and compositions. B. F. Drakenfeld & Co., Inc. **(4-825)**

CARBON BLACK DISPERSIONS. A summary of technical data and operating suggestions covering "dag" concentrated carbon black dispersions for coloring thermoplastic resins is contained in this four-page folder. Acheson Colloids Corp. **(4-826)**

DIHYDROXY DIPHENYL SULFONE. Development data sheet containing information on a sulfone having uses as an electroplating bath additive, a stabilizer for cellulose materials, and in adhesive formulations. Eight pages Monsanto Chemical Co. **(4-827)**

REDS AND YELLOWS FOR PLASTIC MATERIALS. Folder giving complete details, with color chips, on Cadmolith cadmium red and yellow lithopane colors for plastic materials. The Glidden Co. **(4-828)**

VINYL BELTING. Folder containing samples of various cross sections of Geron flexible vinyl plastic belting for use in luggage binding, watch straps, etc. Gering Products, Inc. **(4-829)**

MATERIALS HANDLING EQUIPMENT. Complete 140-page catalog of vibrating batching equipment, machine feeders, joggers, shakers, and weighing machines with numerous applications within the plastics industry. Syntron Co. **(4-830)**

METALLIC SOAPS. Aluminum, calcium, magnesium, zinc stearate. Description, specifications, and uses. Separate leaflet describes advantages of bag packing. Eight pages. American Cyanamid Co. **(4-831)**

ROTARY CUTTERS. Specifications and advantages of Ball and Jewell rotary cutters for regranulating gates, runners, rejects, extrusions, etc., to uniform fineness for reclamation. 24 pages. Ball and Jewell, Inc. **(4-832)**

POWER SHEAR. Folder containing information on a semi- or fully-atuomatic table-mounted power shear for plastic films, sheeting, and laminations. Hobbs Mfg. Co. **(4-833)**

LAMINATED PLASTICS. Illustrated 40-page booklet containing a thoroughgoing discussion of laminated plastics made with Bakelite phenolic varnishes, their properties and advantages. Bakelite Div., Union Carbide and Carbon Corp. **(4-834)**

FILM PROCESSING MACHINERY. Extensive discussion of the manufacture, decoration, slitting and winding, and lamination of supported and unsupported plastic films. Contains many machine illustrations and schematic layouts. 20 pages. John Waldron Corp. **(4-835)**

CASE HARDENING MOLD STEEL. Type analysis and description of Mirromold, a new case-hardening steel, including information on hobbing and machining, strength, heat treatment, etc. The Carpenter Steel Co. **(4-836)**

ALKYD. Three bulletins which give many details on the molding of Plaskon Alkyd, its properties, and uses. Plaskon Div., Libbey-Owens-Ford Glass Co. **(4-837)**

SPRAY MASKS. Article explaining the use of electroformed masks for spray color decoration of plastics and a folder on an automatic spray machine to do the job. Conforming Matrix Corp. **(4-838)**

PHENOLIC MOLDING COMPOUNDS. Complete data regarding the manufacture, use, methods of molding and selection of a variety of compounds. Includes chart outlining physical and chemical properties. 16 pages. Durez Plastics & Chemicals, Inc. **(4-839)**

MOLDED NYLON. Bulletin which cites several recent applications of molded nylon in gears, bearings, and other moving parts of various machine devices. Four pages. Polychemicals Dept., E. I. du Pont de Nemours & Co., Inc. **(4-840)**

PLASTIC MOLDING PRESSES. Various semi-automatic molding, heating, cooling, and hobbing presses, hydraulic pressure pumps, accumulators, etc., are described with specifications and other information. Dunning & Boschert Press Co., Inc. **(4-841)**

FULLY AUTOMATIC MOLDING PRESS. Description of the Stokes No. 741-A molding press for fully automatic molding of Alkyd and for conventional thermosetting materials. F. J. Stokes Machine Co. **(4-842)**

MOLDING FACILITIES. Custom molder's services described from design of product to finished molded parts. 8 pages. Erie Resistor Corp. **(4-843)**

Postage Will Be Paid by Addressee

No Postage Stamp Necessary If Mailed in the United States

BUSINESS REPLY CARD

First Class Permit No. 2684 (Sec. 34.9, P. L. & R.), New York, N.Y.

MODERN PLASTICS

575 Madison Avenue

NEW YORK 22, N. Y.

HEAT FOR PLASTIC PROCESSING

Built to required sizes for

INJECTION MOLDING
COMPRESSION MOLDING
EXTRUSION

Band Heaters
(ceramic and mica insulated)
Cartridge Heaters
Strip Heaters
also . . . Special Requirements

These annealing plates indicate one type of heater built to a customer's special requirements.

INDUSTRIAL HEATER CO., INC.
1921-1950
245 Canal Street New York, N. Y.

Miller
WOOD FLOUR

Formulated to meet the strict requirements of the plastic industry. Miller Wood Flour is an approved uniform product. Available in 4 standard grades, or made up to meet your particular specifications.

Prompt Shipment.
Phone, wire, write us regarding your requirements.

Frank Miller & Sons
2252 West 58th Street, Chicago 36, Illinois

between the glass plates. Figures 4 and 5 show two sequences of flow around a circular insert 0.25 in. in diameter, and a square insert 0.25 in. on a side. It is evident from these pictures that the flow of polymer adjacent to the insert is greatly retarded. As a result, the two polymer streams produced by the insert first join at a distance from insert. The weld line then forms in toward the insert as well as in the direction of polymer flow. Since a small pocket of air is easily trapped between the insert and the point where the polymer first forms the weld line, it will have little strength adjacent to the insert unless means are provided for allowing this air to escape. If the filling process is rapid enough, this entrapment of air may cause the polymer to burn.

Packing and Discharge

Once the mold has been filled, additional polymer is forced into the mold during that part of the cycle which we have called packing. Since the end of filling is considered as that instant when the polymer in the cavity first assumes the shape of the cavity, the pressure in the cavity at the start of packing may be very low. For a cavity of simple shape, this is the case, and the pressure rises to some maximum value during packing. As mentioned previously a hot core of polymer exists in the mold passages and cavity, thereby providing a channel through which the hot polymer can flow. Since the pressure in the cavity is increasing, that polymer which is already in the cavity is reduced in volume, thereby providing room for additional polymer. This action together with cooling in the cavity, which also reduces the volume of polymer, accounts for the phenomenon of packing. It is evident, then, that packing will continue until the plunger forward time ends, except when the flow is reduced to some characteristic value as will be explained later in connection with sealing. Packing is one phase of the polymer cycle which is easily demonstrated with the photo mold. Figure 6 is a series of frames showing packing. The filling ends in going from the first frame to the second, after which packing is evident by the movement of the black streaks near the gate.

During packing, as mentioned previously, the pressure of the polymer in the mold rises to a maximum and thereafter drops rather slowly. This maximum pressure, which was termed "injection pressure" in an earlier paper[1], is usually substantially lower than the ram pressure. In some methods of injection molding, it is an important factor in determining mold shrinkage, bubble and sink mark formation, etc., and is well worth further investigation.

An approximate equation for calculating the injection pressure, P_I, has been developed in another paper[3]. For the box mold with the 12-oz. press, it becomes:

$$\frac{P_I}{P_M} = 1 - \left[\frac{f(T_i - T_o)}{18{,}300}\right]^{\frac{1}{4.4}} \qquad (4)$$

where f is the filling time (seconds) just preceding packing, T_i is the temperature (°F.) at which polymer enters the mold, and T_o is the mold wall temperature (°F.). This equation gives values which are in fairly good agreement with experimental observations, as may be noted in Table III, which presents a few typical data.

At the end of the plunger forward

PURE

UNIFORM STRENGTH

WATER WHITE

LOW IN ACID

LOW METAL CONTENT

DU PONT FORMALDEHYDE SOLUTION

DU PONT FORMALDEHYDE is designed to meet the high requirements of the plastic industry. It's completely dependable—produced under controlled conditions to assure consistently fine raw material.

SHIPMENTS of Formaldehyde, Paraformaldehyde, 95% minimum strength, and Hexemethylenetetramine — Technical — are made in standard containers.

DU PONT
REG. U. S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

For additional information and technical assistance, call our nearest office.

E. I. du Pont de Nemours & Co. (Inc.)
Electrochemicals Department
Wilmington 98, Delaware

DISTRICT OFFICES

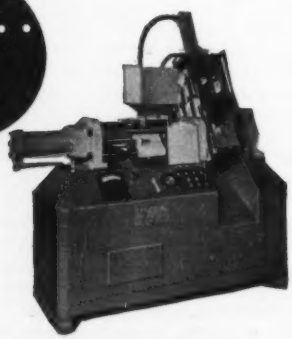
Baltimore 2	321 Fallsway	PLaza 2862
Boston 10	140 Federal Street	HAncock 6-1714
Charlotte 2, N.C.	427 W. 4th Street	CHarlotte 5-5561
Chicago 3	7 S. Dearborn Street	ANdover 3-7000
Cincinnati 2	2412 Carew Tower	PArkway 5253
Cleveland 14	1226 National City Bank Bldg.	CHerry 1-6078
Detroit 26	966 Penobscot Bldg.	WOodward 2-7360
Kansas City 1*	Guinotte & Mich. Aves.	Victor 6240
Los Angeles	P.O. Box 70, El Monte, Calif.	CUmberland 3-2761
New York 1	350 Fifth Avenue	LOngacre 3-6440
Philadelphia 3	1616 Walnut Street	KIngsley 5-1900
Pittsburgh 22	517 Park Bldg.	GRant 1-2960
San Francisco 6	111 Sutter Street	EXbrook 2-6230

*Baroda & Page, Inc.

DU PONT ELECTROCHEMICALS

GET MORE PERFECT SHOTS PER HOUR . . . with a MOSLO 3 Ounce Universal *Minijector*

Completely Automatic INJECTION MOLDING MACHINE



Plastic molders everywhere have discovered there is nothing like a Moslo Universal Minijector for cutting injection molding costs and increasing production. All thermoplastics including vinyls and Nylon are molded fast and smoothly on a Minijector.

We guarantee the production ratings and invite you to compare our specifications. See for yourself that a Moslo Minijector is the best buy in injection molding machines.

Check these outstanding features

1. Completely automatic.
2. Pushbutton controls.
3. Stainless steel, torpedoless cylinder, Patents Pending.
4. All hydraulic.
5. Universal mold-clamp assembly (Operates vertically or horizontally).
6. Quick mold changing.
7. Simple maintenance.
8. Greater versatility.
9. Plasticizing capacity per hour — 35 pounds.
10. Mold casting area — 36 square inches.
11. Maximum injection pressure — 16250 p.s.i.

The Complete Moslo Line Includes:

- The Moslo ¾ ounce hydraulic or hand operated Minijector.
- The Moslo 3 and 4 ounce Universal Minijector.
- The Moslo Duplimatic Minijector.
- The Moslo No. 60 Plastic Granulator.

Get the complete story, write today for information on the Moslo Universal Minijector and the Moslo Minijector line.

MOSLO MACHINERY COMPANY • 2443 Prospect Ave., Cleveland 15, Ohio

Carter
CUTS COSTS WAY DOWN!
CARTER RIGID WHEELS & TIRES
Carter rigid Wheels and 30" & 36" Quick-Change Tires are for heavy-duty high-speed operations. Tires won't throw even at 1800 r.p.m. Changed in 10 min. 20 years service on best machines. Carter products universally accepted as standard equipment by leading bandsaw manufacturers.
Write—
For free illustrated folder!
CARTER PRODUCTS COMPANY INC.
53 Mount Vernon, N. W., Grand Rapids, Mich.

WIPE-IN KOLORS
for filling recessed letters and designs in plastics, metal, glass, enamel
A method of removing excess Wipe-In Kolor
Fast·Easy·No smudge application
• Wipe-In Kolors available in 16 standard and special shades
• Wipe-In Kolors supplied in paste form for economy... with special reducing thinner
• Wipe-In Kolors adhere firmly . . . easy and fast to apply. Excess easily wiped off
Dependable • Odorless • Non Toxic
Write for color card, folder, price list
KEELER & LONG, INC.
originators and manufacturers
P. O. Box 1466, Waterbury, Connecticut

time, assuming that a hot core of polymer still exists in the system, the pressure gradient is suddenly reversed. With this reversal of pressure gradient the flow proceeds from the mold cavity into the tunnel. This action has been called "discharge." While the discharge is readily evident from the motion pictures, it occurs very rapidly and hence is not readily demonstrated in a series of single frames. The discharge ends with the sealing of the cavity.

Sealing the Mold

During discharge the pressure in the mold is dropping quite rapidly, and the rate of discharge drops correspondingly. When this rate becomes low enough the polymer "freezes" in the gate, sealing the mold. This may be observed as a cessation of discharge in the photo mold. The temperature and pressure in the mold at the instant of sealing are important quantities in considerations of mold shrinkage, bubble formation, etc. To determine just what these quantities are under any given conditions we must go back to the polymer cycle as determined by pressure measurements.

Heat conduction theory tells us that the average temperature, $\overline{T}$, of the plastic in the mold will be given by:

$$\frac{\overline{T}-T_o}{T_i-T_o}=\frac{8}{\pi^2}\sum_{n=1}^{\infty}\frac{1}{(2n-1)^2}e^{-\frac{(2n-1)^2\pi^2Kt}{d^2}} \qquad (5)$$

where K is the thermal diffusivity of polystyrene, t is the time elapsed since the instant of filling the mold, and d is the thickness of the polymer section. This formula is derived for the case of a slab; similar expressions exist for rods and spheres. Further, the equation of state for polystyrene[1] tells us that the pressure in the mold will be a straight line function of $\overline{T}$, *after* the mold has been sealed. All that is necessary, then, is to convert time into temperature, $\overline{T}$, via the above equation, and to replot the mold pressure-time curve as P vs. $\overline{T}$. The resulting plot is a straight line in the later stages of cooling, and the sealing point is the point at which the curve deviates from this straight line. The sealing pressure and temperature may be observed directly from the plot.

In another paper[5] some consideration was given to an approximate treatment of the problem of sealing. In brief, it appears that sealing occurs when the rate of discharge drops to a certain characteristic value which is determined by the mold wall temperature, polymer setup temperature, and gate dimensions. This leads to an approximately straight-line relationship between sealing pressure and temperature. For a typical polystyrene in the box mold the experimental sealing points are found to conform to the following equation:

$$P \text{ (in } 10^3 \text{ p.s.i.)} = 22.5 - 0.066\ T \text{ (in °F.)} \qquad (6)$$

This may then be used, with the equation of state, to compute mold shrinkage.

This analysis of the behavior of polystyrene in the mold cavity has of necessity involved molds of simple shape. At first glance this may seem of little value to the fabricator, who is concerned with complicated mold shapes and all of the many variables at one time. We must not lose sight of the fact that only through such a simplified procedure can we hope to gain an understanding of the injection molding process.—END

Rushing "DO" Orders Through

at

KUHN & JACOB

TRADE MARK

One corner of the extensive mold-making department.

Experience and skill combine to produce plastic molding of uniform excellence at KUHN & JACOB. Not only are the principals personally familiar with all phases of the business, but in the early days of the company some actually produced the molds themselves. Because of their intimate knowledge of the processes of production, there is the closest co-operation between the drafting room, the mold-making shop and the molding division. This assures complete satisfaction for K. & J. customers at all times.

ESTABLISHED 1919

Kuhn & Jacob
MOLDING and TOOL CO.
1200 SOUTHARD STREET, TRENTON 8, N. J.
Telephone Trenton 4-5391

CONTACT THE
K & J
REPRESENTATIVE
NEAREST YOU

S. C. Ullman, 55 W. 42nd St., New York, N. Y.
Telephone — Penn 6-0346

Wm. T. Wyler, Box 126, Stratford, Conn.
Telephone — Bridgeport 7-4293

Wm. A. Chalverus,
Philadelphia, Penna.

Save Time, Labor, Dollars!

TEST • STUDY • CONTROL
VISCOSITY
As Simply, Quickly and Easily as Taking Temperature Readings

Just a flick of a switch, then read the Brookfield dial, and you have your viscosity determination in centipoises. The whole operation, including cleaning up, usually takes *less than a minute.*

Available in a variety of models suitable for extremely accurate work with both Newtonian and non-Newtonian materials, Brookfield Viscometers are portable and plug in any A.C. outlet — *can be used in Lab, Plant or both.*

Write today for fully illustrated catalog showing Brookfield Viscometers adaptable to any viscosity problem *from less than one to 32,000,000 centipoises.*

BROOKFIELD COUNTER-ROTATING MIXER — Two concentric, oppositely rotating shafts, propeller equipped and driven by two motors, produce an annular flow and up to 48,000 scissor-like cuts/minute. Enable exceptionally fast, effective and efficient laboratory mixing. *Not* a "stirrer." Write for Brookfield MIXER brochure.

Brookfield ENGINEERING LABORATORIES, INC
276 Porter St., Stoughton, Mass.

The CROWN TUMBLEMIXER

CRISS CROSS *Action*
for MAXIMUM COLOR DISPERSION

PATENT PENDING

MIXES · BLENDS · GRINDS
at MULTIPLE ANGLES

The Crown Tumblemixer with the exclusive feature of CRISS-CROSS action is engineered, designed and constructed for the plastic industry. This new development actually insures maximum color dispersion . . . and operates economically on ½ h. p. motor.

NO CONTAMINATION!
NO CLEANING!
DOUBLE CAPACITY!

ONLY
$450.00
F.O.B.

Distributorship Inquiries Invited

CROWN MACHINERY & EQUIPMENT SALES CO.
2721 SO. SAN PEDRO • LOS ANGELES, CAL. • ADams 3-7251

Hard Board

(*Continued from pp.* 126-30)

The physical properties of typical boards are given in Table II. The flexural strength increased almost directly as density increased and roughly in proportion to the amount of resin used. Water resistance was greatly improved by the presence of pine gum. This is clearly shown by comparing the two boards made from 90% peanut shells. The board containing 10% phenolic resin alone has a water absorption of 20.4%, while that containing 8% phenolic resin and only 2% pine gum has a water absorption of 7.6 percent. Increasing amounts of resin and pine gum lower the water absorption still more, until with 15% phenolic resin and 10% pine gum the minimum absorption of water is 2.2 percent. With increasing percentages of total resin, the density of the boards also increases, which is favorable to lower water absorption.

Only a few boards were made using rice hulls, and since their physical properties were so poor compared to those from peanut shells, most of the study was devoted to the use of peanut shells. It will be noted that the density of the rice hull boards under the same conditions of formulation is less than peanut shell boards. Evidently higher pressures and/or higher amounts of resin will be required to make satisfactory boards from rice hulls.

With 75% peanut shells, 15% phenolic resin, and 10% pine gum, a product having dry and wet flexural strengths of 6200 and 5500 p.s.i., respectively, was obtained. The properties of this board in general are similar to those of a sample of Masonite-tempered hardboard. However, the density of the board was higher than that of the Masonite product.

If it is assumed that there is no cost for peanut shells or wood waste, the cost of binder will be higher in making boards of equal properties from peanut shells than from wood waste. Wood waste appears more advantageous as a raw material for the resin type of panel board, not only from the standpoint of lower cost of board product, but also from the standpoint of merchandising, in cases where the panel board may be directly used in conjunction with wood in the plant manufacturing operations.—END

NEW MOLDING ECONOMY

for small pieces with LARGE areas

MACRAY 4 ounce Injection Molding Machine

Model 4 — MACRAY Semi-Automatic Machine

Model 4A — MACRAY Fully Automatic Machine

For those small shot jobs in big molds, there's no need to tie up your larger machines. Mold with maximum economy in the NEW MACRAY 4-oz. machine. Accommodates molds up to 12" x 23", mounted vertically . . . 13⅜" x 20", mounted horizontally.

And look at these other outstanding MACRAY features . . .

- Simplicity of operation
- Centralized controls
- More efficient cooling
- Longer strain rod bearing
- New longer heating cylinder
- Rugged construction
- Requires minimum floor space
- Prompt deliveries

Write . . . wire or phone for bulletin, price and specifications.

MACRAY ENGINEERING CO.

6611 Euclid Avenue, Cleveland 3, Ohio

A few choice territories are available

GOOD BYE REDUCING PROBLEMS

Many a plastics plant official has been able to say "Good Bye" to his high pressure reducing problems that he thought *couldn't be solved*. How did he solve them? By installing this

ATLAS Type "E"

High Pressure Reducing Valve

shown at the left. Let us say, for example, that YOUR pressure is 5,000 lb. per sq. in. You want to reduce it *without* shock. You think that's a "tough" problem. It isn't tough for ATLAS TYPE "E" which reduces pressures as high as 6,000 psi.—oil, air, or water. And there's no shock.

How Did We Do It?

We didn't develop this remarkable valve during our first year in business. Nor in our tenth. Nor in our twentieth. Or thirtieth. But, we have been at it for more than a half century now—regulating valves exclusively—nothing else—and here it is—Type "E". We make the body of the strongest forged steel. All of the internal metal parts are specially protected. Those parts subject to severe abrasion and corrosion are Stellited. A formed packing of special material superior to leather is used which is immune to all fluids commonly used in hydraulic machinery. The pressure on the seat is balanced by a piston with the result that variations in high initial pressure have little effect on the reduced pressure. Ask for complete description and data.

For other ATLAS plastics plant products see the partial list in our ad in the January 1951 issue of MODERN PLASTICS

ATLAS VALVE COMPANY

REGULATING VALVES FOR EVERY SERVICE

277 South Street, Newark, 5, N. J.

Represented in Principal Cities

Shawnee

REG. U.S. PAT. OFF.

DRY COLORS

COLORS FOR PLASTICS

•

Strontium Chromate Yellow

•

Ming (Molybdate) Orange

•

Organic Red, Maroons
Blue & Green Toners

•

Red & Yellow
Cadmium Toners
(Subject to limitations of NPA Order M-19)

•

Offerings based on extensive experience with leading plastics manufacturers

KENTUCKY COLOR & CHEMICAL CO.
Incorporated

General Office and Works: Louisville, Ky.
Branches and Representatives in Principal Cities

Then you must visit the

BRITISH PLASTICS

EXHIBITION & CONVENTION

Olympia · London · June 6 – 16 · 1951

An unrivalled display of the latest products, materials & plant

THE first Exhibition and Convention of Britain's entire plastics industry will be held in London during the Festival of Britain. Staged in collaboration with producers of raw materials, manufacturers of plastics materials and equipment, moulders and fabricators, it will give *you* the opportunity of studying the finest display of plastics products and processes ever staged under one roof, and of meeting the experts of Britain's plastics industry. The Convention will be extensive in scope, covering technical, applied and general aspects of the industry and its materials. Special arrangements exist for overseas visitors—YOU will be welcome!

Organised by BRITISH PLASTICS—BRITAIN'S PREMIER PLASTICS JOURNAL

Mail Now for colourful descriptive brochure

To: BRITISH PLASTICS, Dorset House, Stamford Street, London, S.E.1. England

Please send me full details of the Exhibition and Convention and of admission facilities

Name _____

Address _____

_____

_____

Vinyl Printing

(*Continued from pp. 81-86*)

regular gravure printing. The refinements relate principally to the size screen used in the preparation of the engraving—care must be taken not to make the engravings too coarse.

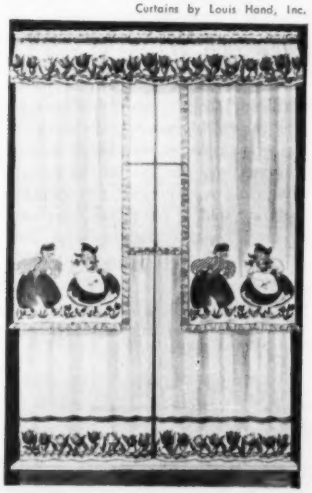
In the first key step in the transfer process, the engraved copper rollers are placed in a unit rotogravure press and are used to print, not film, but rolls of specially treated heavy paper. Each roll of this "carrier" is about 2500 ft. long.

After the carrier has been printed, it is taken to the casting machine. A casting machine, essentially, consists of a belt of some sort to which a film-forming solution or paste is applied. The belt is then taken through a long horizontal oven in which the solution or paste is fused into a finished piece of film. At the end of the oven, the film is stripped from the casting belt and wound into rolls.

In the transfer printing method, the printed carrier paper described above is actually used as a casting belt. A vinyl organosol dispersion is coated on the paper at the beginning of the oven. The oven itself is approximately 300 ft. long. The paper with the organosol on it proceeds through several temperature zones in the oven, which are graduated so as to prevent bubbling because of too fast a fusion, and yet produce a strong and completely polymerized piece of film at the conclusion. During the trip through the oven, the film fuses around the print which was initially put on the paper, and the print becomes an integral part of the film itself! At the end of the oven, when the film is stripped from the paper carrier, the film has a print on its surface and the paper is left completely clean!

Transfer-printed Comark vinyl film is used to fabricate these cottage curtains

Curtains by Louis Hand, Inc.



Because the print is actually a part of the film, it has completely satisfactory abrasion resistance, and no further top coating or finishing is necessary. The paper carrier itself may be reused.

It is not difficult to appreciate the advantages which transfer printing and casting offer:

1) Because the printing is done on paper instead of film, the fidelity of detail and registration is of a quality that is attainable only with difficulty in other processes.

2) No interleaving paper is required, even in multicolor work, thus eliminating a substantial nuisance factor.

3) The film is completely odorless, a feature for which many a factory laborer—as well as consumer—is grateful.

4) The casting operation can be controlled so as to make as thin a film as 2 mils and yet, because of the nature of the process, produce a print as perfect as it would be on a 4-mil film. This makes available a film which, while economical, is highly styled.

5) Since the film is not subjected to any stress during casting—it is a semi-fluid mass which lays flat on the belt through the force of gravity—there are no latent strains in the finished film, and it lies flat on the cutting table. The same uniformity is true of the gage of the film.

Every process has some inherent disadvantages as well as advantages. The main disadvantage of the casting process, at least in the present state of the art, is that as the film increases in thickness—say, as it approaches 4-gage or higher—it encounters difficulty in remaining economically competitive with calendered film. However, both the excellent appearance of transfer printing and the fact that the lower (2 and 3) gages are suitable for a large number of applications, have prevented this disadvantage

Every month the readers of MODERN PLASTICS request thousands of informative booklets, catalogs and other publications which are listed in the Manufacturers' Literature page.
This service to our readers makes it simple for you to send for the literature you want.

Others use it, why don't you?

The Manufacturers' Literature page is printed on heavy colored paper, so it's easy to locate in each issue. All you do is circle the items you want, fill in the free reply card and mail. And before long, you'll receive the literature you have asked for.

Take advantage of this free service without further delay. Turn to the Manufacturers' Literature page *now!*

•

A Service of

MODERN PLASTICS

A Breskin Publication

575 Madison Avenue
New York 22, N. Y.

INVENTIVE
CUSTOM MOLDING

Inventiveness — the ability to see and use new ways to reduce molding costs — is the unique quality offered you in Shaw's custom molding service. INVENTIVE CUSTOM MOLDING by Shaw meets the challenge of higher quality at drastically reduced unit cost. Apply it to your product.

Shaw is fully equipped for all types of molding — compression, transfer, or injection. Shaw's engineers will advise on material selection, assist on design problems.

SHAW

SHAW INSULATOR CO.

MOLDERS SINCE 1892

160 COIT STREET, IRVINGTON 11, N. J.

from being of serious consequence.

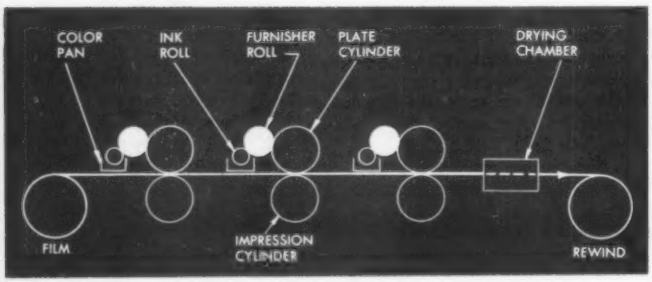
Cast film finds usage in all of the familiar applications of vinyl film. However, transfer printing has contributed to the basic expansion of the film industry into new markets. It is a matter of record that at the beginning of 1948, not one major textile curtain manufacturer featured plastic curtains in his line. The reason was twofold: the curtain trade had available to it in plastics neither the styling nor the price ranges which were required for mass merchandising Such few plastic curtains as were made, were manufactured by "plastic" houses whose business was making everything possible from film, and the curtains were sold on the basis of novelty material rather than soundness of price and style.

When the first 2-gage and the first 3-gage cast films specifically styled for curtains appeared on the market in the form of made-up articles, consumer acceptance was almost instantaneous.

For quality process color work in higher gages, the transfer-printed cast films hold a special high place in consumer and trade esteem.

Aniline Printing

by Philip Whiting*



PRINTING vinyl film on aniline equipment has several distinct advantages over gravure and surface printing techniques and, of course, some disadvantages.

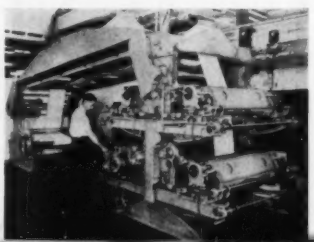
Vinyl films and prints designed for use in draperies, furniture upholstery, table cloths and shower curtains are well suited to the aniline method. Due to the comparatively low cost of rubber print rolls, it is possible to make fairly short runs of an exclusive pattern. When printing draperies, table covers, or any particular job in a single color, speeds of 75 to 100 yd. per min. can be achieved. Multicolor prints, however, are run on aniline presses at approximately 40 to 60 yd. per minute. It is possible to print film up to 60 in. wide on modern aniline presses.

The gage of most vinyl film printed on aniline presses to date has ranged between 3 and 8 mils. Although it is now possible to obtain vinyl film down to 1.5 mils, I believe that the economy of such films would be overcome by the difficulties experienced in handling them on an aniline press. Because of the relatively high tensions involved in the operation of an aniline press, it is desirable to work with film having maximum dimensional stability. The highest production rates and best quality printing on aniline presses are achieved on films of 4 to 8 gage.

The advantages realized when printing vinyl on aniline-type presses are, in general, analogous to the advantages always found in aniline printing. The cost of the rubber print rolls is, of course, considerably less than that of the metal rolls used in gravure and surface-print ma-

(*Continued on p. 193*)

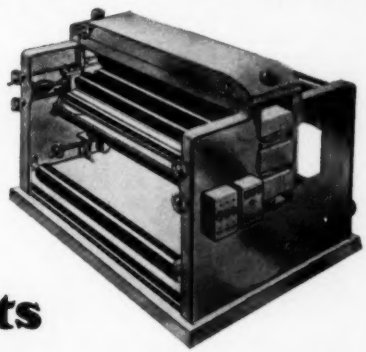
Four-color aniline machine decorating vinyl film at Marvellum Co. plant



* Technical Director, Marvellum Paper Co., Holyoke, Mass.

NEW REVERSE ROLL COATING METHOD CALLED CONTRACOATING

CONTRACOATER



Developed by Dilts in cooperation with experienced operators of coating machinery, this new machine offers the advantages and eliminates the disadvantages of ordinary reverse roll coaters.

Use the Contracoater for:
coating, casting, treating, impregnating
on
paper, cloth, foil, film, duck
with
lacquers, resins, organisols, plastisols

KOHLER SYSTEM EQUIPMENT • PRODUCT OF DILTS

Dilts

at
speeds to and above 300 FPM, depending on drying capacity,
to obtain
controlled uniform coating in exact thickness and width

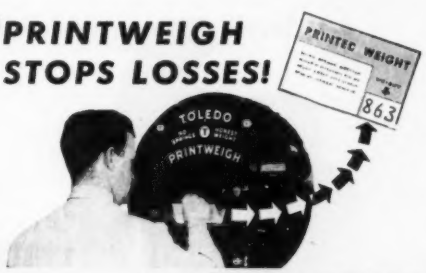
There is no creeping of coating past dams in the Contracoater because the dams are located under, not over, the metering rolls. Gravity aids, does not hinder, the control of coating widths in the Contracoater.

It will pay you to find out about the Contracoater.

Contact Dilts for Contracoaters and for complete coating installations. Write for "Design of the Month" No. 5.

DILTS MACHINE WORKS, Fulton, New York • Division of the Black-Clawson Co. Hamilton, Ohio

PRINTWEIGH STOPS LOSSES!



ELIMINATES HUMAN ERRORS IN READING REMEMBERING AND RECORDING WEIGHTS

PRINTWEIGH SCALES give you *accurate printed records* of each weighing operation . . . positive assurance that your weight facts are right *every* time! Prints big, clear figures . . . on thick tickets . . . on large or small sheets . . . on strips . . . with extra copies. Saves time, stops losses for receiving, shipping, stock rooms, batching and many other weighing operations. Write for bulletin 2021. Toledo Scale Company, Toledo 12, Ohio.

TOLEDO

HEADQUARTERS FOR SCALES

· SPECIALISTS · IN MATCHING COLORS FOR PLASTIC MOLDERS

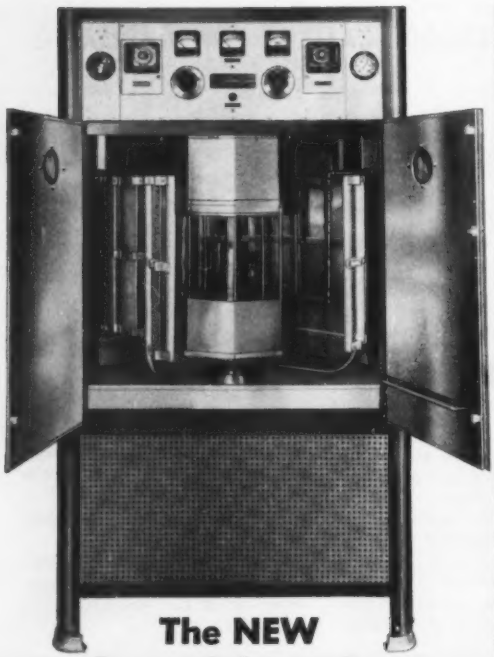
Send us a sample of the color desired with at least five (5) pounds of the material you wish to color. We will return our match for your criticism. We use both dry color and wet dye process.

We also manufacture inks for printing on plastic. Let us serve you.

HOMER W. PALMER AND COMPANY, INC.

515 North Halsted Street Chicago 22, Illinois

Seeley 3-2634



The NEW
Sunshine Arc Weather-Ometer
Type XW

A modernized and redesigned version of the open flame X-1 and X-1-A Weathering Units

Many of the control features that have proven their dependability in the Atlas Twin Arc Weather-Ometer have been combined with some features of the original X-1-A weathering unit to make a new Weather-Ometer of advanced design.

In the Type XW a new means of maintaining constant temperature is provided. Far more accurate temperature control is now available.

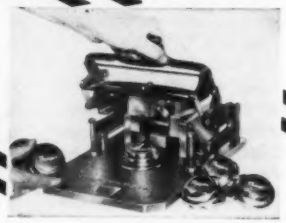
Radiation is from a Sunshine Carbon Arc which is of the motor-driven, open-flame type. Natural sunlight or intensified ultra-violet radiation is available depending upon the type of carbons and filters used. The light source has been improved to provide 16 hours of continuous operation as well as a number of other added conveniences.

All instruments are located on a convenient control panel, including an arc voltage setting switch and meter, cycle control of light and water spray, 1 to 24 hour shut-down time switch, thermo-regulator and running time meter.

Type XW is fully automatic and may safely be left in unattended operation overnight. If deionized water is to be used, aluminum spray piping can be furnished. The capacity of the stainless steel lined testing chamber is 54 panels. The machine is sturdily constructed and is shipped assembled, ready for connection.

ATLAS ELECTRIC DEVICES COMPANY
361 West Superior St., Chicago 10, Ill.
FADE-OMETERS • LAUNDER-OMETERS • WEATHER-OMETERS

COLOR ENAMEL FILL



THIS IS THE ACROPRINTER. IT FILLS LETTERING, NUMBERING AND DESIGN WITH COLOR. MADE IN SEVERAL SIZES AND POWER DRIVEN MODELS. GO MODERN—MAKE YOUR HAND JOBS, MECHANICAL.

Write to—
The Makers of a Full Line of Marking, Numbering and Hot Stamping Machines.

The ACROMARK Company
5-15 MORRELL ST., ELIZABETH 4, N. J.

M&M plastic granulator

In today's market the use of every available piece of scrap has become increasingly important. The M & M Plastic Granulator designed for "on the job grinding" can turn the material from your scrap barrel into usable granules and extra profit. Investigate today!

mitts & merrill
1016 South Water • SAGINAW, MICHIGAN

chines. The ink cost per yard of film is about half that of surface printing and shows some saving over gravure inks. The inks used on aniline presses do not cause curling or puckering of the printed vinyl film.

There are disadvantages to aniline printing which limit the work that can be done with it. Half-tone prints and process work are simply beyond the scope of present-day equipment. Any designs that require more than six colors must be directed to surface print machines which are capable of running up to 12 colors.

The majority of the work turned out so far on aniline presses has been of the wood-cut type. It is possible, however, to print such items as lace patterns with very fine lines. Hand blocked and hand painted effects are well suited to the aniline method.

Vinyl film may be printed on conventional aniline presses with regular cut or cast rubber rolls. It is not necessary to obtain any special rolls for this work, but ketone and aromatic hydrocarbon solvents should, as on any aniline work, be avoided. The high-grade rubber rolls available today have a life span which is greater, almost without exception, than the popularity of any one printed pattern. These rubber rolls average about 40% less in cost than rolls for surface or gravure printing.

The ink used for aniline printing on vinyl is alcohol soluble, non-blocking, non-curling, and is similar in appearance to conventional pigmented aniline inks. These inks do not require any high-molecular weight coating to seal the print and will not offset or create any problems in the fabrication of the printed film. The above statements are predi-

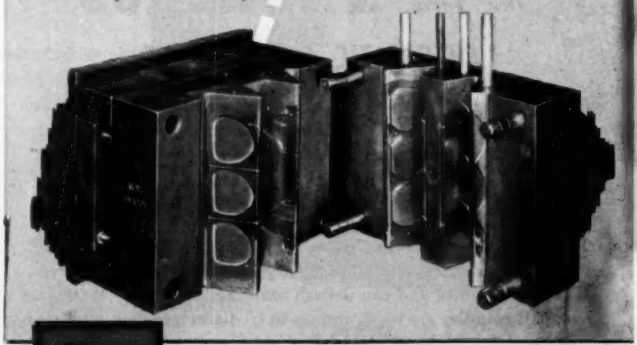
Black and white reproduction of aniline four-color print produced by Marvellum

Accent ON PLASTIC PARTS WITH "PERSONALITY"

MADE IN MOLDS OF
SPEED ALLOY
HOT ROLLED ALLOY STEEL PLATE

Federal Tool Corp., Chicago, selected Speed Alloy for the die that molds the holder for this attractive shaker group—made for International Minerals & Chemical Corp., producers of Accent, famed for accentuating food flavors. The accent was on speed, economy and a mold that would stand up on long runs. Speed Alloy—one of the time saver SPEED STEELS—ably filled the bill.

Like so many plastics molders, Federal Tool—one of the largest producers of molded housewares and closures—has enjoyed repeated success with Speed Alloy. They like its hardenability, excellent polishing characteristics, ability to withstand relatively high compression, availability in large plate sizes (up to 72" wide and 6" thick) and moderate price. Besides plastic molds and zinc die casting dies, Speed Alloy has been widely adopted by many industries for countless machine parts. Contact your nearest source or ask for Bulletin 905.



Since 1856

W. J. HOLLIDAY & CO. (INC.)

SPEED STEEL PLATE DIV.
120 139th St., Hammond, Ind.
Plants: Hammond and Indianapolis, Indiana

DISTRIBUTED BY

Brown-Wales Co. — Boston - Hartford - Lewiston, Me.
Bridgeport Steel Co. — Bridgeport, Conn.
Beals, McCarthy & Rogers — Buffalo, N. Y.
Burger Iron Co. — Akron, Ohio
Grammer, Dempsey & Hudson, Inc. — Newark, N. J.
Earle M. Jorgensen Co. — Los Angeles-Houston-Oakland
Passaic County Steel Service, Inc. — Paterson, N. J.
Peckover's Ltd. — Halifax - Montreal - Toronto - Winnipeg - Vancouver
Peninsular Steel Co. — Detroit, Mich.
Pidgeon-Thomas Iron Co. — Memphis, Tenn.
Horace T. Potts Co. — Philadelphia - Baltimore

CUT COST OF FLASH REMOVAL ON CIRCULAR MOULDINGS

You can turn out 20 to 60 perfectly-deflashed circular or cylindrical moldings every minute with . . .

The New **NASH "103"**

AUTOMATIC FLASH LATHE

Hand flash removal slows down production and adds to the cost of your moldings. The Nash "103" lathe pays for itself quickly with *more and better work at lower cost per minute.*

BUILT THE NASH WAY THROUGHOUT

The Nash "103" confines its operation to the flash area exclusively, maintaining the surface appearance of molded pieces. It has 10 spindles and can deflash moldings up to 4½" diameter when all spindles are used, and up to 6" diameter when alternate spindles are employed. Height adjustments vary from nothing to 8". All necessary adjustments of spindle speeds and heights are easily made.

Write for further details. We also build the Nash "116" Rotary Edger for Plastic Dinnerware.

SPECIAL FINISHING MACHINES SINCE 1890 NASH

J. M. NASH COMPANY

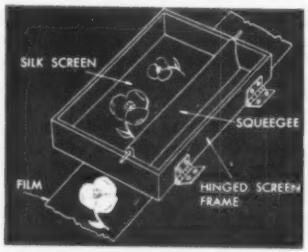
Dept. 103 2370 No. 30th St. Milwaukee 10, Wisconsin

cated on the fact that only high-grade film made with good plasticizers is to be printed.

The economy and quality of work possible through the application of aniline techniques to vinyl printing must be emphasized. If the design falls within the limits discussed above, aniline presses can turn out fine quality work at high speed using relatively inexpensive rolls, ink, and solvents.

Silk Screen Printing

by Frederic Hicks*



THE survival of the silk screen printing process—which might seem to be a primitive printing method—is due primarily to two factors. These are the ease and speed of changing designs and the low cost of making stencils. Only a few minutes are required for the screen printer to change patterns, an operation which may take several hours in machine printing. This saving in time permits the vinyl film screen printer to make runs as short as 500 yards. Such a run would be economically impractical on a machine.

The low cost of making silk screens as compared to the cost of making rotogravure engravings often represents a saving sufficient to more than make up for the high cost of hand printing. Rotogravure engravings usually cost from $200 to $300 per color. This is in addition to a cost of $100 or more for each copper roll. This is in contrast with the $25 to $50 cost of a silk screen. The equipment required for making screens is simple, and they can be turned out quickly. Where a large number of designs is required, and the possibility of long runs is doubt-

* President, Hicks and Otis Prints, Inc., Norwalk, Conn.

PLASTIC SCRAP

CELLULOSE ACETATE BUTYRATE • POLYSTYRENE • NYLON • METHYL METHACRYLATE • CELLULOSE ACETATE • POLYVINYL BUTYRAL • ETHYL CELLULOSE • POLYETHYLENE • POLYVINYL CHLORIDE

WE BUY IT
SELL IT
PROCESS IT

Plastics Division:

H. MUEHLSTEIN & CO. INC.

60 EAST 42nd STREET, NEW YORK 17, N. Y.

BRANCH OFFICES: Akron • Chicago • Boston • Los Angeles • Memphis

WAREHOUSES: Akron • Chicago • Boston • Los Angeles • Jersey City

Mold Temperature Control Unit

Complete and ready to operate when connected to a source of electric power, cold water and drain.

The new Model 6002 Mold Temperature Control unit is a self-contained dual unit, consisting of two independent heating, cooling and circulating systems in a single portable unit. Efficiently adapted to large or small molds.

Exclusive features...

- All controls and dials easy to see and reach.
- High hose connections.
- Fast water circulation—quick response to controls.
- Modulating cooling controls.

Write for detailed information on this new Mold Temperature Control Unit. A money, time and effort saving device priced within reach of both large and small manufacturers.

MANUFACTURERS OF TEMPERATURE CONTROL EQUIPMENT SINCE 1910

Sterlco Model 6002
MOLD TEMPERATURE CONTROL UNIT
INDUSTRIAL CONTROL DIVISION
STERLING, INC.
2736 N. Holton Street • Milwaukee 12, Wis.

drop 'em in the hopper

they COME OUT PRINTED

by this **APEX AUTOMATIC**

Print one or two color decorations, trade marks, illustrations on almost any surface—plastic, glass, metal, wood, cardboard, etc. Automatic, continuous. No skill required to operate! 2500 pieces per hour. Special machines to order.

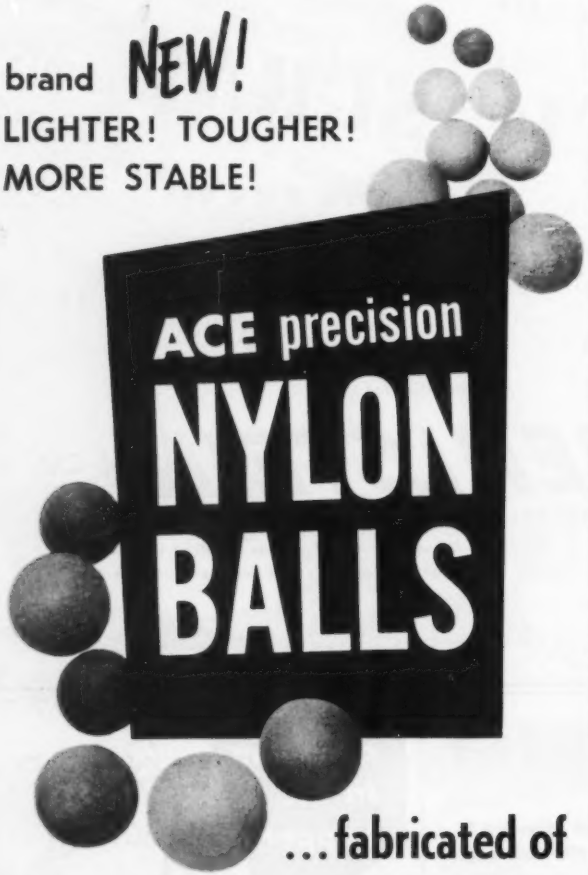
Send for illustrated bulletin and samples of work!

One-Color — Model C-31, $910
One or Two Colors — Model C-32, $960

APEX

APEX MACHINE MANUFACTURING CORP.
53 East 10th St. • New York 3, N.Y.
Largest and Oldest Mfrs. of Multi-Color Ink and Hot Stamping Machines

brand NEW!
LIGHTER! TOUGHER!
MORE STABLE!



...fabricated of

DU PONT NYLON

FM #10001 to close tolerances

ACE is first in the world to give you mass-produced, close-tolerance balls of DuPont Nylon FM #10001. These are tough at low temperature . . . abrasion-resistant—have form stability at high temperatures . . . are light in weight . . . resistant to chemicals. Use them on valves, valve components, specialized anti-friction bearings, detents and mechanical checks and many other industrial applications.

LET OUR ENGINEERS ADVISE YOU

Complete facilities for fabricating plastic parts for all industries. Estimates submitted promptly upon receipt of your blueprints or specifications.

SIZES:
⅛" TO ¾"
TOLERANCES
± .001

Write today for samples and bulletin.

ACE PLASTIC COMPANY
Precision Plastic Fabricators

91-18 VAN WYCK BLVD., JAMAICA 2, N. Y.

ful, silk screen printing is the answer.

Silk screen printing can also justify its higher printing cost when a design has to be exactly fitted to a given shape, as, for example, in the decorating of inflated toys. If such designs are printed in continuous rolls, they almost always have to be hand cut. With silk screen printing, the shapes may be cut in large quantities and individually printed after cutting.

There are, of course, some disadvantages in the process. A heavy deposit of ink is made with the silk screen, which results in a considerable amount of puckering and curling when the process is used on the lighter-gage films. This distortion becomes increasingly severe on materials of less than 6 gage if the areas of printing are very large. Some work is being done in the development of inks that will materially reduce this condition.

While there are a number of processes which can be used for the making of the silk screen stencils, all of which have their place in various industries, the one which is almost universally used when printing with vinyl inks is the photographic method.

This process begins with color separations which are made by tracing out each individual color on a transparent material such as tracing paper or acetate sheet. These tracings are then filled in with a completely opaque ink, resulting in a positive for each color in the design. In the making of the stencil itself, a piece of stencil silk is stretched tightly over a wooden frame which is somewhat larger than the repeat of the design. The silk is then coated in a dark room with a sensitized resist which fills up all of the meshes of the silk. The positive is then placed in contact with the sensitized surface and exposed for a few minutes to a powerful light. This light "fixes" the exposed sensitized solution so that it becomes insoluble in water; the places that have been shielded by the opaque positive remain soluble. The frame is then washed in running water which dissolves away all of the resist covered by the drawing. This leaves the mesh open, permitting ink to be forced through the silk onto the surface to be printed.

Printing is usually accomplished

YOU PLAN IT ... GERING WILL

Extrude IT!

FLEXIBLE or RIGID

for any special-shaped

BELTING - BINDING - EDGING - RODS - TUBES - FILM - STRIPS

Polystyrene - Cellulose Acetate - Polyethylene - Vinyl - Butyrate

Ethyl Cellulose - Acrylic

Extrusions for MILITARY and CIVILIAN uses, in any compounds and colors. Special formulations. Special shapes. Complete cooperation from our Technical Dept.

GERING *Products Inc.*

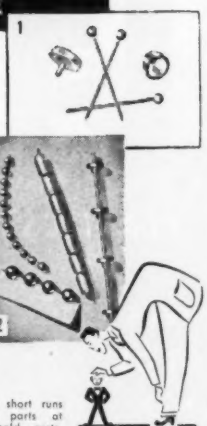
KENILWORTH NEW JERSEY

GRC for specialized SMALL injection moldings at Low Cost

FULLY AUTOMATIC PLASTIC INSERTS

1. INDIVIDUAL INSERTS— Small plastic parts produced with automatic insert feed. High rate of production at low cost. Relatively reasonable mold charges.

2. CONTINUOUS INSERTS— Small plastic members, accurately spaced on continuous insert mediums, such as tape, cord, wire, chain, etc. This new method can also produce alternating 2-color products, as well as "jump-spaces" when desired. Economical production and mold costs.



ALL Thermoplastics! NYLON a specialty!

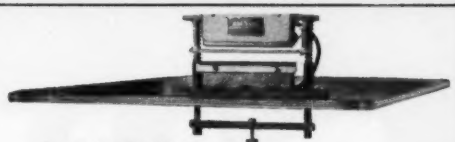
We specialize in short runs of tiny plastic parts at unusually low mold costs.

Maximum size: .03 oz. — 1¼" long
Minimum size: Unlimited

Write Today for Samples and Prices

GRIES REPRODUCER CORP.

133rd Street & Willow Ave., New York 54, N. Y.



AMSCO foot operated BAG SEALERS

Designed expressly for packagers with limited production or as an auxiliary machine in large plants for short runs without disturbing mass production set-ups.

outstanding features:

- Thermostatic control
- Minimum effort
- Strong pressure
- Perfect weld
- Rugged construction

THERE IS AN AMSCO FOOT SEALER FOR EVERY TYPE OF HEAT SEALABLE MATERIAL

Cellophane
Diafane
Maralux
Polyethylene
Pliofilm
Foil
Barrier material

Standard width sealing surfaces — 7", 14½" and 22".

Write Dept. MP-4 for literature

JOBBER INQUIRIES INVITED

AMSCO PACKAGING MACHINERY, INC.

31-31 48th Avenue

Long Island City 1, N. Y.

Specialists in Diversified Packaging Equipment.

AMSCO HAND SEALER

for package wrapping with Polyethylene, Pliofilm and Plasticized Films.

Only THERMOLATOR

Does the Complete Job of Mold Temperature Control

"How to the Line" with THERMOLATOR

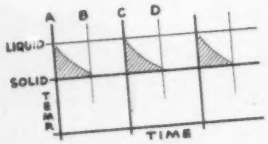


Fig. 1

The heat in liquid plastic, when injected into the mold at (a) and (c), must be drawn off to convert it into a solid at (b) and (d).

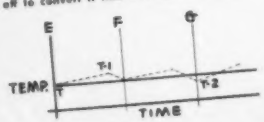


Fig. 2

This chart shows possible variations in mold temperatures during casting cycles, which begin at (e), (f), and (g). Quality of product depends on holding mold temperatures closely to the straight line, eliminating peaks and valleys represented by (t_1) and (t_2).

Because of superior design resulting from our long experience in temperature control . . . because of individual features on which Patents are Applied For and Pending . . . THERMOLATOR can hold temperature variations within a range of 2° F., while adding to or draining heat from either or both halves of the mold.

Can You Afford Anything But the Best?

Your Inquiry is Invited. Write to—

INDUSTRIAL MANUFACTURING CORP.

31 E. GEORGIA STREET ★ INDIANAPOLIS 4, INDIANA

REPRESENTATIVES:

F. W. Jennison—Room 603, 570 Seventh Ave., New York 18, N. Y.

Pacific Scientific Co.—1430 Grande Vista Ave., Los Angeles 23, Calif.

IN CANADA: Richardson Agencies, Ltd.—454 King St. West, Toronto 1

DANIELS

FOR THERMOSETTING PLASTICS PLANT

T. H. & J. DANIELS LTD.
STROUD, GLOS.
ENGLAND

by first stretching the material to be printed on a long table. The screen is then moved along the material with successive prints being made in repeats which are usually from 24 to 36 inches. In order for the process to run continuously, it is necessary to have several tables so that while printing is being done on one table, additional lengths of material can be laid up on others.

Of course there are many variations in the technique used in different plants, but the above is the generally used method.

Equipment

Most of the equipment used to print vinyl film has been either altered from standard commercial units or built entirely to the printer's specifications. A partial listing of manufacturers of presses for printing vinyl film follows:

Unit Type Gravure

Champlain Co., Inc., Bloomfield, N. J.
Inta-Roto Machine Co., Richmond, Va.
Klingrose Div., American Type Founders Sales Corp., Elizabeth, N. J.
Lembo Machine Works Inc., Paterson, N. J.
Unicrafts Co., Amherst, Mass.
John Waldron Corp., New Brunswick, N. J.

Drum-Type Gravure

Champlain Co., Inc., Bloomfield, N. J.
Hudson-Sharp Machine Co., Green Bay, Wis.
Rice, Barton Corp., Worcester, Mass.

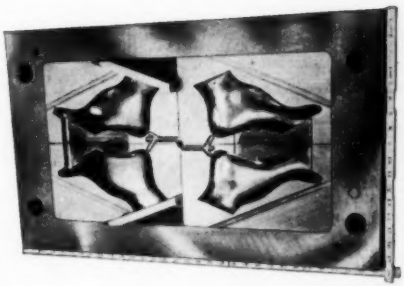
Surface-Type

John Waldron Corp., New Brunswick, N. J.

Aniline Type

Champlain Co., Inc., Bloomfield, N. J.
H. H. Heinrich Inc., New York, N. Y.
Hudson-Sharp Machine Co., Green Bay, Wis.
Inta-Roto Machine Co., Richmond, Va.
Kidder Press Co., Inc., Dover, N. H.
John Waldron Corp., New Brunswick, N. J.
Wolverine Paper Converting Machine Corp., Detroit, Mich.

how do you determine the cost of a plastic mold?



Do you look at the price tag? Sometimes it's misleading! Take the so-called "bargain" mold, for example. As long as you use it, you never stop paying for it . . . in excessive rejects, headaches, and production tie-ups. For somewhere in its making somebody skimped on materials, care, or skill. To *accurately* determine how much a mold costs, measure the initial price against *results*.

And if you buy plastic parts outside, it pays to consult a reliable custom molder, backed by a skilled moldmaker. Together, they design and build a mold to fit the job. The extra care, skill, and better quality steels they use, more than pay for themselves in greater production of fast-selling parts.

For years, reputable moldmakers have relied on Carpenter Electric Furnace Mold Steels. Their workmanship plus the constant improvements Carpenter is making in already successful mold steels, give you double assurance of *economical* molds in the long run. The Carpenter Steel Co., 112 W. Bern St., Reading, Pa.

Export Department: Reading, Pa., "CARSTEELCO"

When you have mold work done outside, consult a custom molder backed by a reputable moldmaker!

Write for useful leaflet on Samson Extra!

Molds built and engineered by A. & M. TOOL & DIE CO., cavities hobbed by NEWARK DIE CO. Molds used by COWAN & BOYDEN CORP. to produce these shoe forms for C. S. PIERCE CO. Chief Engineer of Newark Die Co. says: "I consider Carpenter SAMSON EXTRA a vast improvement from standpoints of hobability, core strength, machinability, and finishes".

SPECIFY *Carpenter* ELECTRIC FURNACE MOLD STEELS

VACUUM MELTED CLEAN DIOK SOUND UNIFORM

100% Acid Disc Inspected

THE PLASTISCOPE*

NEWS AND INTERPRETATIONS OF THE NEWS

By R. L. Van Boskirk

From Fishing Rods to War Work

AN impregnated glass cloth previously used in fishing rods is now being diverted to a ducting material for planes and boats by Southwest Tackle Co., Inc., 2904 W. Lancaster St., Fort Worth, Texas.

The material used is a glass cloth impregnated with phenolic. The phenolic is modified with nylon which, for some strange reason, seems to act somewhat as a plasticizer. For making fishing rods, it is formed into a hollow tube with Owens-Corning unidirectional glass fiber cloth No. 143. The cloth is cut to a flat pattern, rolled over a steel mandrel, and the whole covered with cellophane. About 1000 lb. pressure is applied, the shrinkage factor of the cellophane being utilized to help develop bonding pressure. The lay-up is then baked and the core removed. The company has made as many as 2200 of these phenolic-glass fishing rods a day.

For war purposes this same glass fiber cloth impregnated with phenolic is being used as ducting. One of its prime features is that it will resist a 400° F. temperature, according to the producer. In most other war uses this fabric will be used with polyester, in which case its heat resistance is about 300° F., according to W. L. Raschke, executive vice-president of the company. He says that other than for air craft, most of his war output will probably be concentrated on polyester glass-type fabric.

Bur Sharpener

BUR resharpening and salvaging service is now being offered by Pratt & Whitney, Div. Niles-Bement-Pond Co., West Hartford 1, Conn., to all users of carbide and high speed steel burs. This service aids the tungsten and cobalt conservation program, since these materials, which are used in the manufacture of carbide, are now critically short. Special machines of the company's own design are used in this operation, insuring complete shank concentricity plus uniformity of flute spacing with cutting qualities claimed to be equal to those of a new bur.

Treatment for Fungus

FUNGICIDAL concentrates to be dispersed in suitable carrying agents for use as additives for molded plastics are now available from The Wilbur & Williams Co., Greenleaf and Leon Sts., Boston 15, Mass. The company has worked with the Navy during and since World War II on tropicalization problems involving the handling of toxic fungicides and meeting the Defense Specifications for Fungicidal Molded Items.

Monomer Developments

THE heated contest between the rubber and plastics industries for styrene supplies and the curtailment of vinyl chloride plastics expansion by shortages of chlorine have focused new attention upon the monomers from which vinyl-type polymers are prepared. Monomers are the unsaturated small molecules (gaseous, liquid, or in some cases solid) which in polymerization combine to form the long-chain molecules of high polymers, basic materials for plastics.

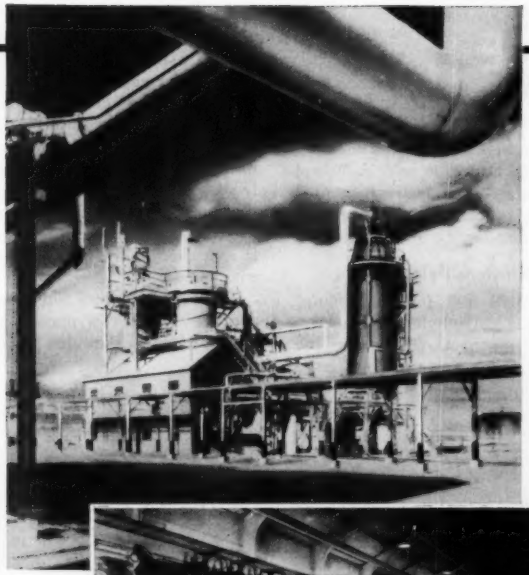
The production and consumption of monomers in the rubber, fiber, and other fields bordering on plastics may directly affect supplies of molding powders, sheets, and films. For example, the expected growth of Du Pont's Orlon acrylic fibers and of other acrylonitrile polymer fibers (Chemstrand, American Cyanamid, Industrial Rayon, Tennessee Eastman, Imperial Chemical Industries, and others) may lead to cheaper acrylonitrile monomer and to expansion in styrene-acrylonitrile copolymer plastics. Such copolymers, of greater heat resistance and toughness than polystyrenes, already are available from U.S. Rubber, Bakelite, and others. American Cyanamid, which at present is the main supplier of acrylonitrile liquid monomer (39¢ per lb.), recently made available a book reviewing its properties and applications, including polymerization.

An unexpected monomer development was the recent reduction in the price of methyl methacrylate monomer by Rohm & Haas. This reflects not only improvements in manufacturing processes but also a flourishing business in related methacrylate copolymer oil additives in addition to the outlet in Plexiglas. Some of the higher methacrylate esters are also used in dental plastics and in special finishes for textiles and leather.

Vinyls—Interest in a number of the vinyl-type monomers centers around their copolymerization in minor proportions with the more familiar monomers such as vinyl chloride and styrene (vinyl benzene). Instead of acrylonitrile, 10 to 30% of vinyl carbazole, chlorostyrenes, or alpha-methylstyrene may be copolymerized with styrene to give plastics of higher heat distortion temperature than polystyrene. Vinyl chloride may be copolymerized with small proportions of acrylic esters, maleic esters, or with vinyl ethers in order to obtain vinyl plastics of better solubility and flexibility than polyvinyl chloride. Certain of these comonomers can be used to give "internally plasticized" vinyl copolymer elastomers (with little or no added plasticizers). However, a few remaining technical problems must be solved before the plasticizer business is threatened.

The vinyl pyridine monomers, which are now supplied in limited quantities by Reilly Tar & Chemical Corp., appear to have a rosy future. The latest of these to become available in pilot plant quantities is 4-vinyl pyridine (also called gamma-vinyl pyridine). Small proportions of vinyl pyridine monomers, when copolymerized with acrylonitrile, give fibers with superior dyeing properties. Vinyl pyridines used with butadiene and styrene give specialty copolymer rubbers. Vinyl pyridine polymers are also of interest for ion exchange resins, polyelectrolytes, polysoaps, and for an-

* Reg. U. S. Pat. Office.



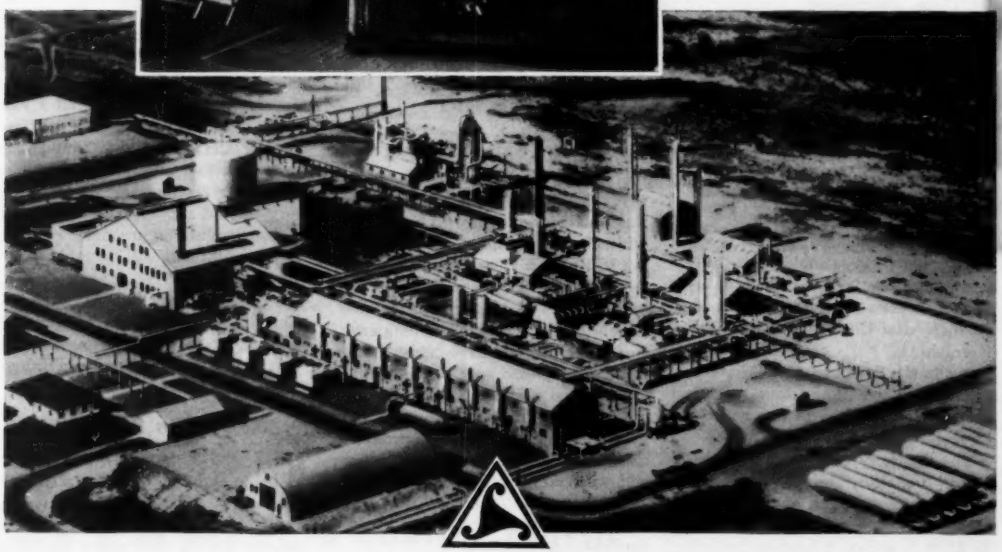
NOTHING IS WASTED

To insure maximum use of the field, the new Elk Basin Unit Repressuring Plant at Elk Basin, Wyoming, includes provision for recovery of over 90 per cent of pure elemental sulfur from sour gas and the generation of flue gas for repressuring. This releases the sweetened natural gas for sale purposes. Operated for the Unit by Stanolind Oil and Gas Company, the plant recovers propane, butane and natural gasoline from casinghead gas. Design and construction were by Stone & Webster Engineering Corporation.

Above: Sulfur Recovery Unit.

Center: Interior of Compressor House showing feed and inert gas compressors.

Below: General aerial view of plant.



STONE & WEBSTER ENGINEERING CORPORATION

A SUBSIDIARY OF STONE & WEBSTER, INC.

PLASTISCOPE

tihalation layers in photographic films. The possibilities of vinyl pyridines in plastics are as yet uncertain.

The preparation and properties of a number of the less familiar monomers are discussed in the recently published "Monomers," Section II, edited by E. R. Blout and H. F. Mark, published by Interscience Publishers, Inc. Among the chapters in this book are the following: Acrylic Esters, by J. T. Clarke; Methacrylic Esters, by R. S. Corley; Vinyl Carbazole, by K. C. Frisch; Vinyl Ethers, by C. E. Schildknecht; and Vinyl Pyridines, by H. L. Frisch. A third section of this book is planned which will be devoted to a discussion of styrene derivatives and other monomers.

New Thin Gage Vinyl

AVAILABILITY of 1.7 gage calendered unsupported vinyl is announced by Ross & Roberts, Inc., Stratford and West Haven, Conn. This is claimed to be the first time that anyone has been able to offer a 0.0017-in. calendered unsupported vinyl film on a commercial scale and follows the company's development last November of a 0.002-in. product. The new material is available in a variety of colors and widths. Distribution is being handled through Ross & Roberts Sales Co., Inc., 350 Fifth Ave., New York, N. Y.

Metallic Colorants

METALLIC colored pigments for thermoplastic moldings have been notoriously hard to handle because of certain explosive hazards in their use. Gering Products, Inc., Kenilworth, N.J., one of the pioneers in the development of dry colors, asserts that it has found a safe method for molders to use metallic Drycol.

The company now stocks six different metallic Drycol colors for distribution at prices ranging from $1.98 per 100-lb. unit price in silver to $2.98 in green. All prices include sufficient Blend-Eze, a liquid used in conjunction with Drycol which assures complete incorporation of the colorant into the molding compound as well as improved molding conditions. Drycol is sold in 50 and 100-lb. units—that is, each unit is sufficient to color that amount of molding powder.

Polyethylene Flying Saucers

BALLOONS 100 ft. in diameter made of polyethylene have been identified by the U. S. Navy as the so-called flying saucers which have created considerable furor over the last three years. An article concerning these Skyhook balloons was printed in MODERN PLASTICS, May, 1948, p. 100. They are used for carrying instruments to test cosmic rays in the stratosphere and will reportedly ascend to a height of 20 miles.

Each balloon consumes between 120 and 150 lb. of polyethylene, depending upon the waste involved in cutting gores. From 75 to 100 have been fabricated each year since 1947. No decision has been made on future procurement, according to Navy spokesmen who state that procurement might be increased no more than two or three times the present quantity.

One Plasticizer in Good Supply

EVERYONE knows that lack of plasticizers may hold down expansion of vinyl usage this year, even though raw materials are found to make more vinyl. Moreover, the shortage includes not only the widely used types such as DOP and tricresyl phosphate; but according to Rohm & Haas Co. spokesmen, the sebacic acid types such as dibutyl and dioctyl sebacate which are widely used to impart low temperature flexibility are now being channeled largely into vinyl wire-coating applications and coated fabrics for military use. The shortage exists despite substantial increases in production facilities over the past two years and will likely continue because of ever increasing demands for low temperature resistance in all military applications.

In this flood of shortages there is at least one encouraging note. Rohm & Haas announces that it has recently tripled production capacity for its Paraplex G-60, a low-cost plasticizer. As a result of this increased capacity, G-60 is presently available in good quantity. G-60 is an all-purpose plasticizer notable particularly for its stability. It acts as a stabilizer against heat in processing and against deterioration from light in service. It is claimed that use of G-60 can reduce the need for standard stabilizers by 50% in extrusion, fabric coating, and film compounds.

The company does not foresee a shortage in the raw materials used for purposes of Paraplex resin production.

Polyester Textile Fiber

THE trade mark "Amilar" has been adopted by E. I. du Pont de Nemours and Co., Inc., for its new synthetic polyester textile fiber formerly known as Fiber V.

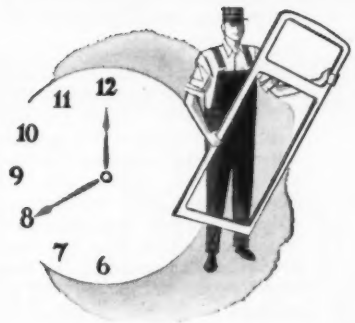
The material is a condensation polymer obtained from ethylene glycol and terephthalic acid. It is not chemically related to nylon, Orlon acrylic fiber, or any other Du Pont fiber. Filament and staple yarn are presently being made in an experimental operation at the Seaford, Del., plant of the Nylon Div., but a new plant is to be constructed on a 635-acre tract near Kinston, N. C. Construction will not begin until some time in 1952.

At present, only limited quantities of such things as window curtains, shirts, and suiting of Amilar are being tested. It is reported that a suit made from Amilar on sale in New York retails at around $90 and shirts at around $10, but it is pointed out that these products are made from very limited supply of the fiber and their prices are no precursor of what the eventual cost will be to the consumer.

It is also known that experimental thin film made from this same polyester material is being experimented with in both England and the United States on a limited scale.

Acrylic Signs for Vehicles

NEW and enlarged quarters are being taken over by Pen-Sar Plastics Co., 206-8 E. Constant St., Tampa, Fla. Pen-Sar started business in Tampa four years ago as a fabricator and jobber of acrylic items. About a year later, the company developed taxi cab roof lights fabricated from acrylic which today



. . . if future plans require it . . .

here's how **your customers** can cut costs and make larger parts or products faster

They can examine the time-saving steps offered by PLASTICS! Advances in plastics technology—particularly in *polystyrene*—have placed plastics first in many manufacturers' plans. With improved polystyrene formulations, new molding techniques and machinery, they now can make *larger area moldings* in one piece . . . many with complicated and intricate designs.

They can cut production time with these new moldings because they can eliminate many assembly steps and speed their production cycle. And their product quality may be improved, too, because polystyrene won't chip, peel or rust! Polystyrene comes in a wide range of attractive colors . . . colors built right into this famous plastic. This means they can keep their finishing operations to a minimum.

Dow, as a leader in the plastics industry, offers you and your customers a complete line of *quality controlled* polystyrene plastics under the trade mark name, Styron, plus the expert assistance of Dow's Plastics Technical Service. When looking at the shape of things to come in '51, be sure to include Styron plastics in your planning for future civilian or defense products. Write Dow today.

Plastics Division—Dept. MSOT-10

THE DOW CHEMICAL COMPANY
MIDLAND, MICHIGAN

New York • Boston • Philadelphia • Washington
Atlanta • Cleveland • Detroit • Chicago • St. Louis
Houston • Los Angeles • San Francisco • Seattle
Dow Chemical of Canada, Limited, Toronto, Canada

***STYRON*...a quality plastic for a quality job!**

DOW plastics

PLASTISCOPE

are used on cabs throughout the country.

The first cab-top light made was 10 in. long—the largest is now 26 in. long. From the backlog based on that particular item, the company branched out into commercial signs, automobile sun visors, and custom work; it has now developed an acrylic road sign lighted with black light and an advertising sign—to be used on the back or side of trucks, buses, taxi cabs, etc.—which may use either black light or white light. The only equipment inside the streamlined plastic case of the advertising sign is a specially designed tube which lights the sign and a small voltage converter which makes it possible for the regular car battery to light this special bulb. Any color or design copy may be inserted in the sign and changed at will.

Closures

THE closure industry consumed 24,554,506 lb. of plastic, mostly thermosetting, for plastic caps in 1950. This figure compares with 19,248,655 lb. in 1949, according to figures released recently by the Bureau of the Census.

Ion Exchange Resins

GREATEST problem foreseen in the near future for ion exchange resins is not in the resins themselves, but in the equipment needed in water purification plants. Suppliers of water conditioning equipment say that they will be unable to produce apparatus six months from now unless they can obtain the necessary metal for tanks and component parts.

Several types of resins are used for ion exchange, some of which will probably be discontinued. The largest volume is polystyrene, for which the essential monomer should be available because of the essentiality of the end use and the relatively small percentage of present styrene production which these resins require to satisfy the need. However, there are already indications that the present confusion existing in the distribution of industrial chemicals generally may result in shortages of these industrially important products. There will be several military uses similar to those in World War II when ion exchangers were used to produce ion-free water for rubber manufacture and boiler feed water for power plants. It is believed that phenolic-type ion exchangers will be restricted.

Plastics for Durable Goods?

PLASTICS as replacements for metals for consumer durable goods recently received a blasting from C. W. Blount, vice president of Bakelite Co., division of Union Carbide and Carbon Corp., following inferences from various sources that plastics would be widely used to replace metals in consumer items.

Mr. Blount stated that reports which give the impression that plastic materials are available in quantity are entirely erroneous. He points out that the two most likely plastics for replacing metal, from the standpoint of properties, are phenolic laminates and polyester glass laminates.

The phenolics are limited by the allocation of phenolic resin to users who cannot obtain enough for their present demands.

The polyester glass laminates are in such demand for projected war uses that current facilities for producing glass fiber are being expanded several fold. There is little hope at present that there will be much of this material available for civilian uses, says Mr. Blount.

Furthermore, he states, all the materials mentioned above involve resins made in part from benzol, and any expansion of availability would force a decrease in the amount of benzol going into synthetic rubber production.

Hong Kong Imports

PRESS reports recently asserted that "a shipload of polystyrene" had been unloaded in Hong Kong in mid-January, although an export embargo had been declared on goods from the U.S. in December.

Inquiry made at the U.S. Dept. of Commerce indicates that any plastics shipped to Hong Kong and unloaded in January were in transit long before the embargo went into effect.

Plastics materials shipped to Hong Kong from this country in November, which probably made up the goods referred to in the newspaper story, were as follows, according to Census Dept. export figures:

Material	*lbs.*
Polystyrene	380,440
Vinyl chloride and vinylidene chloride including sheet and film	205,381
Phenol formaldehyde other than molding compound	8275
Urea and melamine coating resins	4500
Other urea resins	3400
Cellulose nitrate sheet	3326
Cellulose acetate molding powder	34,792
Vulcanized fiber	34,099

Polyester Molding Material

CONTENT of new polyester molding material announced by Kurz-Kasch, Inc., includes about 30% glass fibers along with catalyst and pigment. The polyester-glass molding material can be compression molded into intricate shapes and can have molded-in holes. The producer claims that, unlike other thermosetting materials, it has no mold shrinkage. The material has heat resistance up to 350° F. and no moisture absorption.

Alcohol

FIGURES for the actual amount of alcohol used in plastics have never been published, but it runs into millions of gallons. It is used for acetic acid, which is needed for the manufacture of cellulose acetate; for plasticizers, laminating varnishes, and solvents. Furthermore, it is used in the synthetic rubber program for the manufacture of butadiene.

Both industrial alcohol producers and distillers assert that there will be plenty of alcohol to meet any emergency, but that a large portion of it may come at a very high price. Users of alcohol today claim that it is scarce.

Today's capacity for ethyl alcohol is believed to be somewhere between 800 million and 1 billion gal.

BAG PRODUCTS...

Faster—Easier!

Easy to Use..Low in Cost

Designed to handle bagged products with a minimum of effort at a maximum speed. Simple adjustments for height . . . tilting forward or backward enables operator to set machine at easiest position. Stainless steel trough with capacity of 200 bags. Adjustable to bag sizes. Blower keeps bag clean and free from foreign matter.

Send Today for Bulletin No. 4-31

Anderson BROS. MFG. CO.

ANDERSON BROS. MFG. CO., ROCKFORD, ILLINOIS

Lind

PLASTIC PRODUCTS

CUSTOM MOLDERS

These plastic spoons conform to the *highest standards of specifications and fabrication.* The design and materials were carefully selected by our experienced craftsmen so that these spoons would be durable yet decorative—practical yet inexpensive.

NOTE: Federal Government Defense Prime Contractors—We invite your inquiries on sub-contracting and will be happy to discuss the facilities of our plant in connection with any production problems you might have.

Lind PLASTIC PRODUCTS!

REMEMBER!

LIND PLASTIC PRODUCTS *specialize in* **Custom Molding!**

4451 W. Rice St., Chicago 51, Illinois

ABSORBING facts about NIBRO-CEL®

for Laminates

NIBRO-CEL, a scientifically processed saturating paper, is unexcelled for uniform absorbency and resin pick-up —because of Brown Company's complete control of manufacture from raw material to finished product.

Ideally suited for use in the manufacture of decorative laminates for table tops, counter tops, bars, partitions, panels and wall surfacing. NIBRO-CEL gives laminates greater impact strength; NIBRO-CEL's uniform saturation results in fewer rejections . . . means higher production and lower costs for you. Other characteristics of NIBRO-CEL include:

- **Uniform Formation**
- **Even Caliper**
- **Smooth, Level Surface**
- **Excellent Punching and Milling Qualities**

It will pay you to write for further information about NIBRO-CEL. Brown Company's Technical Service Division will work with you on your problems. Address Dept. MP-4

A PRODUCT OF QUALITY BROWN *Company*

Berlin, NEW HAMPSHIRE

GENERAL SALES OFFICES: 500 FIFTH AVENUE, NEW YORK 18, N. Y.

Branch Sales Offices:

Portland, Me., Boston, Chicago, St. Louis, San Francisco, Montreal

SOLKA & CELLATE PULPS • SOLKA-FLOC • NIBROC PAPERS • NIBROC TOWELS • NIBROC KOWTOWLS • BERMICO SEWER PIPE, CONDUIT & CORES • ONCO INSOLES • CHEMICALS

PLASTISCOPE

broken down as follows. The petroleum companies could produce 150 million gal. or more of synthetic alcohol from petroleum. Liquor distillers are believed to have a capacity of 300 million gal. of grain alcohol, but they would have to start stockpiling alcohol and stop making whiskey, as they did in the last war, if their production is to be counted as a part of the industrial alcohol volume. Industrial alcohol producers could produce something like 300 million gal. from molasses and other agricultural products. During the war nearly all industrial alcohol was produced from molasses, although some of the molasses plants were run on flour when molasses was not available in sufficient quantity, and if they were not equipped to handle grain. A program of this size would require about 6 million gal. of molasses, which might not be available, and would thus force the use of more grain for alcohol or else sacrifice a certain amount of sugar when the cane is processed. Another source of alcohol is the three midwest plants built by the government in 1942 which might produce 100 million gal. a year.

The disturbing item in this picture is cost, since grain alcohol costs around $1 a gal. with industrial or synthetic alcohol being produced at much lower cost.

During World War II, ethyl alcohol production ran at a peak rate of about 600 million gal. a year for one short period. About 150 million of that was for the Institute Rubber plant, and 100 million for Russia. The amount needed for synthetic rubber is of significance to plastics in that it shows why the synthetic rubber program will not be cut back because of any lack of butadiene. The reason is that if the rubber program cannot be maintained with present supplies of butylene from petroleum—because the latter is being diverted in some quantity to make alkylates for aviation gas—alcohol will be used in ever-increasing quantities to make butadiene. It requires about 1000 gal. of alcohol for a ton of rubber. Alcohol plants can be built in two-thirds the time required to build a plant for making butadiene from petroleum.

Insofar as alcohol for plastics is concerned, ethyl alcohol—either synthetic or industrial—is the type generally used, but the specialty alcohols such as octyl or butyl which are used in plasticizers are also frequently made from ethyl alcohol.

New Coal Tar Chemical

PILOT plant quantities of 4-Vinylpyridine are now available from Reilly Tar & Chemical Corp., 191 Doremus St., Newark, N.J. The new product can be used in the manufacture of synthetic elastomers, plastics, textile chemicals, photographic chemicals, and in organic syntheses. High melting point solids have been made from it by polymerization.

Acrylic Bell Jar

SUITABLE for all types of laboratory work is a free-blown acrylic bell jar developed by Lustra-Cite Industries, Inc., 225 W. 28th St., New York, N.Y. The jar is made in two sizes, 7 and 10-in. diameter, and in two grades—"A" for observation and protection purposes; "B" for testing under vacuum.

Award Nominations

NOMINATIONS are now being accepted for the John Wesley Hyatt Award, offered annually to that individual who, in the opinion of the Committee, has made the greatest contribution to the progress of the plastics industry. The winner receives the John Wesley Hyatt Gold Medal and $1000. To be eligible, nominees need only be connected with the plastics industry in any capacity. There is no entry fee. Entry blanks or further information may be obtained from William T. Cruse, committee secretary, The John Wesley Hyatt Award, 295 Madison Ave., New York 17, N. Y. Closing date for nominations is April 30.

Custom Elastomers

CUSTOM formulation of many kinds of natural and synthetic rubbers and resins into adhesives, coatings, sealants, sizings, and binders is now being offered to industry by The Flintkote Co., 30 Rockefeller Plaza, New York 20, N.Y. The company, which has had long experience in many fields of industrial and building products, including roofings, coatings for waterproofing, insulation, and sound deadening, is working with latex compounds, solvent cements, and dispersions in a great variety of standard and special formulas. The company's specialty rubber developments are produced at its Whippany, N. J., plant.

New Canadian Plant

PLANS for a new plant to be built near Edmonton, Canada, have been announced by Celanese Corp. of America. The new plant will tap the natural gas and petroleum resources of Alberta and utilize the company's process of direct oxidation of petroleum hydrocarbons which has been so successful in its Texas plant. Acetic acid produced in the new plant will be combined with wood pulp from the Columbia Cellulose, Ltd. plant (a Celanese affiliate) at Prince Rupert, B.C. to manufacture cellulose acetate. Other products include formaldehyde, methanol, and acetone.

FINANCIAL

Monsanto Chemical Co. has announced that sales for 1950 were $227,135,206, an increase of $61,210,506 over sales for 1949. Net income for 1950 was $26,220,333 after taxes, or $5.37 a common share compared to $3.74 a common share after taxes in the preceding year.

Union Carbide and Carbon Corp. announces net income of $124,111,851 on sales and other income of $770,622,957 for 1950 compared with an income of $92,210,192 on sales and other income of $595,205,738 in 1949. Total sales for 1950 were $758,253,539, the highest in the company's history.

Koppers Co., Inc. had a net income of $11,615,498 after taxes for 1950, compared with $7,111,997 for the previous year. Sales during 1950 amounted to $213,791,687 compared with sales of $192,314,685 in 1949.

COMPANY NOTES

Alleghany Plastics, Inc., 613 Chestnut Rd., Sewickley, Pa., has an-

Makes

good merchandise

sell better . . .

Transparent Kodapak Sheet casts a spell over merchandise—and customers. Colors look brighter—products fresher and more attractive. Shoppers see what they want—and buy what they see—when it's packaged in Kodapak Sheet.

Due to essential government orders . . . together with critical shortages of basic materials, current supply of Kodapak Sheet is necessarily limited. In your planning, please consult your local representative or write

Cellulose Products Division, Eastman Kodak Company, Rochester 4, N. Y.

Sales offices in New York, Chicago. District sales representatives in Cleveland, Dallas, Philadelphia, Providence. Pacific Coast distributor: Wilson & Geo. Meyer & Co., San Francisco, Los Angeles, Portland, Seattle. Canadian distributor: Paper Sales Limited, Toronto, Montreal.

Kodapak Sheet

"Kodapak" is a trade-mark

PLASTISCOPE

nounced an expansion of facilities for printing, laminating, blanking and forming various plastics.

Pacific Optical Corp., 6101 W. Century Blvd., Los Angeles, is a newly formed subsidiary of **McCulloch Motors Corp.**, manufacturer of gasoline-engine products. The new company "provides a quantity source on the West Coast for glass or plastic lenses and prisms, plastic aircraft enclosures, and other optical products," says Robert McCulloch, president of the firm.

General Electric Co. has appointed **Edwin H. Howell** special representative of the Apparatus Dept. in Washington, and **Robert G. Boulter** manager of sales planning and analysis for the Laminated & Insulating Products Division. **Joseph C. Mogavero** has been named facilities engineer of the Manufacturing Div. of the Chemical Dept., assigned to organics, plastics, and laminated products. **Vernon R. Childress** has been appointed manager of sales analysis and planning for the Chemicals Div. of the same department.

The Federal Tool Corp. is now located at 3600 W. Pratt Blvd., Chicago 45, Ill.

Arnold Brilhart, Ltd., Mineola, N. Y., announces change of name to **Brilhart Plastics Corp.**

Plastiglide Mfg. Corp., Santa Monica, Calif., is now located at 3122 Nebraska Ave.

Nopco Chemical Co., Harrison, N. J., has announced that **John N. Gammon** has been named Southern district manager, **Travis V. Rankin** is now district manager for the Central States area, and **Russell F. Gagnier** has joined the New England sales staff.

Swedlow Plastics Co. has opened a Midwestern manufacturing and fabrication plant at 333 N. Meridian Rd., Youngstown, Ohio, under **Fred Stefan** as general manager. Additional facilities have also been opened at 3435 Malt Ave., Los Angeles, Calif.

Chemical Plants Div., Blaw-Knox Co., has formed a Resins and Plastics Dept. under the management of **Arne Olson.** Mr. Olson has been with the firm since 1930.

Griffin Chemical Co., San Francisco, has been named exclusive Northern California sales representative by **West Coast Chemicals & Solvents Corp.** to handle all products manufactured by its subsidiary **Lac Chemicals, Inc.**, Culver City, Calif.

Elmer E. Mills Corp., Chicago, Ill., has named **Mrs. Frank G. Burns** secretary and a director, and **Herbert S. Ruekberg** and **LeRoy T. Kinder** vice presidents of the company.

The Parker Stamp Works, Inc., Hartford, Conn., has purchased the entire business of **Schoder & Lombard Stamp & Die Co.**, New York, N. Y., manufacturer of steel stamps, dies, plastic molds, and other allied products.

The Bellows Co., Akron, Ohio, has established West Coast regional headquarters at 733 E. Pico Blvd., Los Angeles, Calif., under **George Cook**, manager.

A. Bamberger Corp., 703 Bedford Ave., Brooklyn, N. Y., announces that **Gerald F. Bamberger** has been elected president, and **Walter E. Hirtz** vice president of the firm.

Stewart Hartshorn Co., 350 Fifth Ave., New York, N. Y., has announced that its Oswego, N. Y., mill has facilities for coating paper with various types of resin coatings. The processes employed include emulsion, solution, plastisol, and organosol.

Koppers Co., Inc., Pittsburg, Pa., announces the appointment of **George M. Walker** as assistant vice president and **E. E. Kimmel** as technical advisor of the Chemical Division.

Art Plastics has moved to new quarters at 1102 E. 14th St., San Leandro, Calif.

The Patterson Foundry & Machine Co., E. Liverpool, Ohio, has opened a new district sales office in the Majestic Bldg., Denver, Colo., under the supervision of **Robert Alldredge** and **William Horblit.**

The Goodyear Tire & Rubber Co. has announced that **I. N. Lanning** and **J. H. Houlette** have joined the Chemical Div. staff at Akron. **A. E. Whitney, Jr.**, represents Pliovic vinyl resins for the same division in the New England and Middle Atlantic states, with headquarters in New York.

Shell Chemical Corp. is producing epon resins at a new plant at Houston, Texas.

Monsanto Chemical Co. has named **Edward W. Gamble, Jr.**, as Washington representative in charge of the company's office, with **J. R. Glatthaar** as his assistant. Mr. Gamble succeeds **Herbert W. Yeagley. Thomas A. DeMarco** has joined the sales development staff of the Plastics Div. in Springfield.

Clopay Corp., Clopay Sq., Cincinnati, Ohio, has announced a substantial increase in the extrusion capacity of its Industrial Div., with particular emphasis on large extruded sections produced on machines up to 8 in. in size. Laboratory facilities have been expanded to handle an increased volume of custom formulations for extrusions, particularly low-temperature and fungus-resistant materials for the Armed Services.

Du Bois Plastic Products, Inc., has taken over **B. F. Oishei Plastic Co.**, and in the future all operations of the Du Bois firm will be concentrated at the Oishei plant, 168-178 Florida St., Buffalo N. Y. **Norman Taylor** is president of Du Bois.

Monsanto Chemical Co., St. Louis 4, Mo., has appointed **Dr. Carroll A. Hochwalt** and **Felix N. Williams** to the **Executive Committee.** Both men are vice presidents and members of the board of directors. The company has also named **M. S. McCauley** sales project manager of the **Organic Chemicals Division. Ernest S. Robson, Jr.**, and **J. William MacKay** have been transferred to the **Western Div.'s** sales force.

General Electric Co. has appointed **Dr. A. L. Marshall** manager and **Anthony J. Nerad** assistant manager of the newly formed **Chemistry Divs.** of the firm's **Research Laboratory.** The new group consists of five divisions: the **Organic Chemistry Div.** headed by **Dr. William E. Cass;** the **Analytical Chemistry Div.** under **Dr. Herman A. Liebhafsky,** who is also acting head of the **Physical**

BROTHER! THIS AIN'T FUN!

We don't enjoy telling you we can't let you have more of the Santicizers—140, 141, 160 and all the others—than called for in your contract. (We can't spare a spoonful of any Santicizer.) We're not laughing ourselves to tears because we're forced to tell you that, even with the world's most complete line of plasticizers, we can't take on any new business. (Even our expanding capacity can't meet all the demand.)

We'd much rather be pounding on your door asking for orders than to be working ourselves bowlegged in the plant. (We don't like to seem to neglect old friends or to miss opportunities to make new ones.)

It *is* a pleasure, though, to know that our products have served you so well that you want 'em. And we're proud of the fact that so many of our plasticizers are short because they're going into products for mobilization.

We're looking forward to the day when we will again be knocking on your door. In the meantime, if you have an urgent problem in the use of plasticizers, whistle. Maybe we can show how to make your plasticizer supply go further and give you better service.

MONSANTO CHEMICAL COMPANY,
Organic Chemicals Division, 1700 South Second St.,
St. Louis 4, Missouri.

Santicizer: Reg. U. S. Pat. Off.

MONSANTO
CHEMICALS — PLASTICS

Serving Industry . . . Which Serves Mankind

WHISTLE if you have an urgent plasticizer problem and we'll come a-runnin'.

PLASTISCOPE

Chemistry Div.; and the **Chemical Process Engineering Div.** headed by **Dr. Albert E. Schubert**; Mr. Nerad continues to head the work in **Mechanical Investigations Division.** The company has also appointed **Henry A. Vaughn** manager of manufacturing of the **Meter and Instrument Divisions.**

Firestone Plastics Co., Pottstown, Pa., has opened new sales offices in Chicago in the American Furniture Mart, 666 N. Lake Shore Drive, to handle Velon films and upholstery sheetings. Two sales agents will have headquarters in the new space—**Phillips-Davis, Inc.** and **Keeton Textile Co., Inc.**

PERSONAL

Melvin Proball has purchased an interest in **James O'Sullivan & Associates**, plastics engineers and designers, 3124 North Avenue, W., Chicago, Ill. He will assume charge of plastics and die-casting mold design.

C. W. Smith, formerly with Plaskon Div., Libbey-Owens-Ford Glass Co., recently joined the **Chemical Div., The Borden Co.**, as senior chemical engineer.

Thomas M. Gow as been named assistant to Floyd J. Gunn, head of the coatings section of the plastic sales division of **The Dow Chemical Co.**, Midland, Mich. **Ross D. Visger** has been named to succeed him in the New York office.

Jack H. Rines has been named general sales manager of **Pioneer Latex & Chemical Co.** and its affiliate **Pioneer Industries, Inc.**, Lincoln Blvd., Middlesex, N. J.

Kenneth B. Cary has been appointed vice president of **Burgess Pigment Co.**, 64 Hamilton St., Paterson N. J., in charge of the rubber and plastics sales division. He joined the firm in 1949. **John D. McAleer** has been added to the company's sales staff.

J. H. DuBois, manager of the **New Product Development Div., Plax Corp.**, Hartford, Conn., reports that in his new activities he is primarily concerned with evaluating new plastics products that may be produced by blowing, extrusion, injection molding, or other processes. He reports that his company is expanding its manufacturing facilities and will combine the efforts of the men in his organization with personnel of **Hartford Empire Co.**, parent firm, to make available a group of physicists, chemists, and machine and mold designers who can provide the means for careful evaluation of plastics products.

Robert B. Coombs has joined the sales staff of **Steiner Plastics Mfg. Co., Inc.**, 47-30 33rd St., Long Island City, N. Y.

William T. Wood, director of production of **Nylon Div., E. I. du Pont de Nemours & Co., Inc.**, has been appointed assistant manager of the division in charge of Fiber V operations. **Charles E. Mears** has been named director of production for nylon.

Harold R. Potter has been named sales manager for **The Carpenter Steel Co.**, Reading, Pa., with headquarters in Cleveland, Ohio. He succeeds **James S. Bailey**, who has been appointed assistant to the vice president in charge of sales.

Dr. Philip L. Southwick, associate professor of chemistry at Carnegie Institute of Technology, has been awarded a Frederick Gardener Cottrell grant by the **Research Corp.** to continue a research project in synthetic organic chemistry.

Gordon B. Thayer of the plastics division, **The Dow Chemical Co.**, was appointed a member of the **Rubber and Plastics Div., executive committee of American Society of Mechanical Engineers** at a recent meeting.

Ivor B. Watts, formerly of Brilhart Plastics Corp., has joined **Fine Colors Co.**, Paterson, N. J.

Marvin Friedman has been appointed production manager of **Andrel Products Corp.**, 55 S. 11th St., Brooklyn, N. Y., specialist in tools, dies, and injection molding.

W. H. Woodrow has joined **Hale & Kullgren, Inc.**, Akron, Ohio, as chief engineer. The firm is engaged in designing and building machinery and complete processes for the rubber and plastics industry.

Harry E. Hartzell, operating assistant for the **Cellulose Products Dept., Hercules Powder Co.**, has been appointed to supervise production activities conducted by the firm's British operations.

Oscar L. Olson is the new president and general manager of **Swedish Crucible Steel Co.**, Detroit, Mich., manufacturer and molder of plastics. The company is now devoting 65% of its output to war contracts.

Kenneth T. Barker is now in charge of chemical engineering and plant design for **DeBell & Richardson, Inc.**, Hazardville, Conn.

E. E. Hardesty has been named factory manager of the **San Diego Div., Narmco, Inc.**, Calif.

Deane R. Ebey has been named coordinator of defense activities for plastics at **The Dow Chemical Co.**, with headquarters at Midland, Mich.

MEETINGS

Apr. 16—Semi-Annual Meeting, The Packaging Machinery Manufacturers Institute, Hotel Dennis, Atlantic City, N. J.

Apr. 17-20—American Management Association, 20th National Packaging Exposition, Auditorium, Atlantic City, N. J.

May 17—Worcester - Leominster Chapter Meeting, The Society of the Plastics Industry, Sterling Inn, Sterling, Mass.

May 24-25—The Society of the Plastics Industry, Annual Meeting, Greenbrier Hotel, White Sulphur Springs, W. Va.

June 14-16—Pacific Coast Chapter Meeting, The Society of the Plastics Industry, Tahoe Tavern, Lake Tahoe, Calif.

June 18-22—American Society for Testing Materials, Annual Meeting, Atlantic City, N. J.

S.P.E. Meetings

Apr. 9—Upper Midwest Section of S.P.E. at Esslingers' Cafe, 1927 University Ave., St. Paul, Minn. A program dealing with "Product Design" will be arranged by J. Formo and S. K. Moxness.

RAW MATERIAL SHORTAGES CUTTING YOUR CIVILIAN PRODUCTION?

Today we must *all* clear the decks . . . and pitch in doing what we can to further the defense effort. Our government needs your facilities . . . and ours . . . for

DEFENSE ORDERS

The Services require many articles made of injection-molded vinyl compounds, and slush-molded plastisols. We are prepared to supply our DENFLEX Vinyl Injection Molding Compound, and DENFLEX Plastisols, for applications involving defense end uses.

Send us your specs—let us submit our quotations . . . and samples . . . that will enable you to get your share of Defense Orders.

DENNIS CHEMICAL COMPANY

2701 Papin Street — St. Louis 3, Mo.

Stamp Names or Trademarks

ON YOUR PLASTIC PRODUCTS

with the easy-to-use *Kingsley*

Up to 1,000 stampings per hour.

No skilled operators necessary.

Uniform, clean-cut stampings in gold or colors.

Write us about your marking requirements. Enclose a sample or dimensions of part to be stamped. We'll reply air mail with complete details on how a Kingsley Machine can be applied to *your specific need.*

Kingsley STAMPING MACHINE CO.
1806 CAHUENGA BLVD., HOLLYWOOD 28, CALIF.

1,500,000 glowing Rudolphs molded in

PROCESS MOLD

"Hi-Pressure Cast" Beryllium Copper Cavities

Pull the string and Rudolph's nose glows. That's Rubicon's Rudolph the Red Nosed Reindeer novelty lapel pin. Since the internal parts and battery must fit exactly, precision manufacture was a "must."

Fully one and a half million Rudolphs have been molded in Process Mold cavities. Despite this large production, recent samples are faithful reproductions of the hob . . . further proof of the wearing ability of Process Mold cavities.

- precision reproduction
- unlimited cavities from hub
- low cost
- minimum tooling time
- trouble-free molding
- high fidelity

These are the qualities you need. Call your Process Mold representative.

Molded for Rubicon, Inc., New York, N. Y. by Cowan Boyden Corp., Providence, R. I. Molds by New England Tool Co., Taunton, Mass.

DISTRICT SALES OFFICES

Eastern
Arthur L. GeWertz
521 Fifth Avenue
New York 17, N. Y.

California, Oregon and Washington
Walter S. Harmon
4057 McClung Drive
Los Angeles 8, Calif.

Kansas, Missouri and Oklahoma
Albert Tool & Gage Co.
2301 Harrison St.
Kansas City 8, Missouri

Georgia
J. A. Postell
936 W. Peachtree St., N.W.
Atlanta 3, Georgia

Minnesota
William K. Nelson
253 Plymouth Bldg.
Minneapolis 2, Minnesota

Wisconsin
H. E. Beck Company
759 N. Milwaukee Street
Milwaukee 2, Wisconsin

Illinois
William Mackey
5000 Irving Park Blvd.
Chicago 18, Illinois

Ohio & Indiana
A. T. Mullen
P. O. Box 430
Auburn, Indiana

Michigan
R. P. Livermore
11471 Kercheval Ave.
Detroit 14, Michigan

PROCESS MOLD CO.
11471 Kercheval Ave., Detroit 14, Mich. VAlley 1-5210

CLASSIFIED ADVERTISEMENTS

MODERN PLASTICS reserves the right to accept, reject or censor classified copy.

EMPLOYMENT • BUSINESS OPPORTUNITIES • EQUIPMENT (used or resale only)

MACHINERY and EQUIPMENT FOR SALE

FOR SALE: Quick Delivery Rubber and Plastic Equipment. Farrel 18"x45", 16"x48", and 15"x 36", 2 roll rubber mills. New 6"x12" Lab. Mixing Mills and Calenders. Other sizes 30" to 60". Royle #2 perfected extruder, and other sizes. 500 ton HPM Molding Press 42"x48". 200 ton F. B. Hydr. Molding Press 40"x32"; 180 ton F. B. 26"x26". Francis 175 tons 24"x18". W. S. 115 ton 24"x24". Also presses 20 to 500 tons from 12"x12" to 48"x48". Hydr. Oil Pumps. Watson Stillman Hor 4 plgr. 1½" & 2½"x4" H & L pressure pump. HPM 10 GPM 2700 lbs. Elmes Hor. 4 plgr. 5 & 8 GPM 4500 lbs., & 5500 lbs. Hydr. Accumulators. Stokes Automatic Molding Presses, Stokes & Colton Rotary & Single Punch Tablet Machines ½" to 3". Injection Molding machines 2 oz. to 20 oz. Baker Perkins jacketed mixers 200, 100, 50, 9 and 0.7 gals. capacity. Impregnating units. New and used Rotary Cutters & Mikro Pulverizers. Heavy duty mixers, grinders, pulverizers, gas boilers, etc. Partial listing. We buy your surplus machinery. Stein Equipment Co., 90 West St., New York 6, N.Y. WOrth 2-5745.

FOR SALE: 50 Ton Stokes Presses & Pump, 200 Ton W.S. Hobbing PRESS, 300 Ton W.S. PRESS 24 x 20 Platen, 175 Ton H.P.M. PRESS 30 x 30 Platen, 150 Ton Farrel PRESS 30 x 30 Elec. Platen. 140 Ton W.S. PRESS 23 x 17 Platens, 85 Ton Stewart Bolling PRESS 20 x 20 Platen, 50 Ton Elmes PRESS with 18 x 18 Elec. Plates, 75 Ton W.S. PRESS 15 x 15 Platen, 75 Ton Adamson PRESS 20 x 20 Platens. Laboratory presses, Accumulators, Piston and Oil Pumps. AARON MACHINERY CO., INC. 45 Crosby St., N.Y.C.

FOR SALE: Thermex Preheater, Model 2P; Airtronics Preheater, Model D E; Airtronics Preheater, Model C B. Like new. AARON MACHINERY CO., INC. WOrth 4-8233 45 Crosby St., New York 12, N. Y.

We handle hydraulic presses, pumps, and power units of all sizes. Write us your requirements and we will try to help you. We find it impossible to list our equipment in this classified column due to the fact that the equipment is sold before ad is published. For those who seek action look in the New York Times under the Machinery and Tool Column for our regular Sunday Special. Hydraulic Sal-Press, Inc., 386-90 Warren Street, Brooklyn 2, N.Y. MAin 4-7847

SAVE WITH GUARANTEED REBUILT EQUIPMENT — HYDRAULIC PRESSES, 24" x 24", 18" ram 318 tons; 24" x 56", 450 ton multiple opening; 24" x 24", 16" ram, 250 tons; 24" x 24", 12" ram, 170 tons; 24" x 42", 2—12" rams, 340 tons, 42" x 42", 16" ram, 250 tons; 36" x 36", 12" ram, 141 tons; 20" x 18", 10" ram 118 tons; 20" x 20", 10" ram, 118 tons; 10" x 24", 10" ram, 70 tons; 22" x 15", 8" ram, 75 tons; 27" x 21", 8" ram, 75 tons; 15" x 15", 8" ram, 75 tons; 12" x 12" 7½" ram, 60 tons; 12" x 12", 6½" ram, 50 tons; 8" x 9½", 4½" ram, 20 tons; 16" x 16", 3½" ram, 12 tons; Laboratory Presses; 10 ton Carver 6" x 6". Watson Stillman 30 ton, 6" x 6"; Laboratory Millsand Calenders (NEW) M. D.: THROPP Mill 16" x 40" M. D.: NEW DUAL PUMPING UNITS, all sizes; Extruders; Royle Rubber #2, Royle Plastic #1, PREFORM PRESSES, Stokes T, Colton, 5½ T and Stokes DD84 with Reeves Drives, also Mixers, Vulcanizers, Accumulators, etc. Universal Hydraulic Machinery Company, 285 Hudson Street, New York City 13, N. Y.

FOR SALE: 2 Ball & Jewell #1½ Stainless Steel Rotary Cutters, 30 HP Motors—1—Thropp 10"x24" Plastics Mill with chrome plated rolls, and explosion proof motor. Also Extruders, Compression and Injection Molding Presses, Mixers, etc. Send us your inquiries. Consolidated Products Co. 13-14 Park Row, New York 38, N.Y.

FOR SALE: Inland Equipment Stainless Steel Band Conveyor; 8 ft. long, 1 ft. wide; Variable Speed Drive; Practically New. Majestic Extruders, Inc. 445 West 31st Street, N.Y. 1, N.Y.

FOR SALE: Carver Lab Press, Ten Ton, late model, serial 13800-90. Electric platens, 110 volt, thermostat control, extra metal cased thermometer. Purchased from maker, used about 60 hours, on tests for customer, project now finished. Press never used to capacity or abused. Owner, D. C. Giles, 414 Winsor St., Jamestown, N. Y.

FOR SALE: No. 200 A Stokes fully automatic molding press, priced at $900.00. No. 1 Royle plastic extruder with oil heater. No. 2 Royle plastic extruder with oil heater. No. 4 Royle extruder. Ball & Jewell scrap grinder, priced reasonable. Reply Box 883, Modern Plastics.

FOR SALE: Double Arm Jacketed Mixers, Sigma Blade—25 gal. to 250 gal.—J. H. Day, W & P. Read, etc. Stokes Rotary 16-punch pellet presses. PERRY EQUIPMENT CORP., 1529 W. Thompson St., Phila., 21, Pa.

FOR SALE: New 2 oz. model H200 Van Dorn Injection Molded Machine used 96 hours, with timer. Mold for salad bowl, extra #22 mold base assembly, sample of salad bowl at request. $250.00 F.O.B. Ready to ship in original crate. Reply E. G. Collins, 1873 Alabama Ave., S.W., Birmingham, Ala. Phone 56-8953.

FOR SALE: Complete wood flour mill. Capacity 10 tons per 24 hours, using nearby supply of pine and poplar. For further particulars address Box 888, Modern Plastics.

FOR SALE: Hartig Extruder 3¼" with Reeves Drive 25 H.P. Motor excellent buy. Ad-Color Display, 1341 Brandywine St., Phila., Pa. Phone WALnut 2-2748.

FOR SALE: Injection Presses: 4 and 6 oz. Reed, 2, 4 & 40 oz. HPM, 4 oz. Crown W. preplastic. 6 & 12 oz. Watson small & medium scrapgrinders. Despatch Ovens. 1-Leiske Plastitreat Dryer. 2-Impco Moldtemp. Circulators. 1-600 ton downstroke Compression press. 10-various size Compression presses. 1-Lux 1 AS Rotary Preformpress. 2-Preco lab. presses. 1-Nash Rotary Edger. 1-Eclipse 3 HP gas boiler. 1-42" Johnston Slitting & Rewind. machine. 1-51" Sheet Die, take-up & cool. unit for No. 2½ NRM. 1-Automatic Dipping & Drying unit for Plastisols, Vinyls & rubber latex. 1-Wilson 37F Air-Form press. Justin Zenner, 823 W. Waveland Ave., Chicago 13, Ill.

FOR SALE: 24"x66" Farrell-Birmingham 3 roll calender, herringbone geared, bored rolls, rigged for plastic (leatherette and like). Includes smoothing roll, embossing rolls, and cooling rolls, first grade, recently rebuilt. Available for prompt delivery. STEWART BOLLING & CO., INC. 3190 East 65th St., Cleveland 27, Ohio.

FOR SALE: Model 4-200 Van Dorn 1 ounce Plastic Injector Press with Mold Base #2. Reply Box 901, Modern Plastics.

FOR SALE: R.C.A. Electronic Metal Detector. Brand New except used for tryout. Reason for selling—discontinued line. Reply Box 902, Modern Plastics.

FOR SALE: Injection Molding Machines: Three 22 oz. Reed-Prentice, One-16 oz. Reed-Prentice, One-16 oz. HPM, Five-8 oz. Reed-Prentice, Two-6 oz. Groteleit, One-4 oz. Reed-Prentice. Reply Box 905, Modern Plastics.

IMMEDIATE DELIVERY: B&J Rotary Cutters #0, #1½, #2, #2½ with AC motors & knife sharpeners. — Injection Molding Machines all sizes—Extruders—Roll Mills—Heavy Duty Mixers all sizes—Send Us Your Inquiries—What Have You For Sale? For Better Buys & Service Call SOuth 8-4451. You Can BANK on the Equipment Clearing House, Inc., 289 10 St., Brooklyn 15, N.Y.

FOR SALE

INJECTION MOLDING MACHINES

REED PRENTICE, 4-oz., 8-oz., 16-oz., 22-oz. ..... Late
LESTER-PHOENIX, 2-oz., 4-oz., 6-oz., 8-oz. ..... Late
WATSON STILLMAN, 6-oz. Mod. KF (2 avail.) ..... Late
H.P.M., 9-oz. & 16-oz. Late, excellent
IMPCO, 1½-oz., 32-oz. & 48-80-oz. ... Late

HYD. PLASTIC PRESSES

350 T. SOUTHWARK rebuilt 18" St. ... 2,450.
200 T. FARREL 24"x24" pl. 14" ram 1,750.
170 T. BURROUGHS 14" St. 21"x21" Pl. 1,850.
100 T. FARREL Self Cont. 13" St. . . 1,950.
75 T. STANDARD '40, Vert. & Horiz. 1,975.
75 T. D & BOSCHERT 8" St. 16" platen 800.
50 T. JOHNSON 16" St. 30"x30" Pl. . .2,250.
50 T. W&S, 8-9" Ram, 6-10" St. (9) . . Offers
50 T. BALDWIN LOCO. 6" St., 14"x14" Pl. ..... 1,650.
NEW PLASTIC TRY-OUT SCREW PRESS ..... 1,200.
STOKES Mod. 200D2 ..... Offers

MISCELLANEOUS — HYD. PUMPS

VICKERS Hyd. Pump, Mod. V135, 17GPM, 15HP ..... 750.
B&S Gear Pump & Allis 5 HP. 500-1000 p.s.i. ..... 200.
PRATER PULVERIZER, Size 20, complete ..... 1,200.
SHUTZ-O'NEIL Pulverizer, 20 HP., Style D. ..... 950.
PHENOLIC POWDER PLANT, complete ..... Offers
NAT'L Accumulator Pressure Vessels .. 900.
I. R. Comp. & Vacuum Pump 18"x6" ... 650.
NATCO DRILL, Mod. E-5 ..... 950.

EVEREADY CO. E. J. McCallum, Prop.
805 Housatonic Ave. Bridgeport, Conn.

FOR SALE: (2) G.E. 100 HP 300 RPM Synchronous Motors, complete with motor generator sets and starting equipment. New 1948. JOHN F. CARSON, 2829 N. Broad St., Phila. 32, Pa., BAldwin 9-5932.

Over 50 IMS 12 oz. Replacement Heaters for 8 oz. Reeds are now in operation. As a result we offer good buys on used Reed-Prentice 8 oz. original equipment heaters suitable for regular work, emergencies, parts salvage or standbys. Price only $500 each. Injection Molders Supply Company, Penton Building, Cleveland 13, Ohio.

FOR SALE: 1 Speedylectric steam boiler, Model 632,200 lbs. pressure. Boiler in good condition. $150.00 F.O.B. Milwaukee, Wis. Reply Box 922, Modern Plastics.

MACHINERY and EQUIPMENT WANTED

WANTED: Extruders, any size, electrically heated or oil heated, No. 20 Defiance preform machine, Stokes rotary tablet press Model 230 or similar, compression molding presses and laminating presses, scrap grinder, steel platens drilled for steam heating. Reply Box 884, Modern Plastics.

WANTED: Extruder, 1½" all electric, also ¾-oz. hydraulically operated Moslo Minijector. Reply Box 885, Modern Plastics.

WANTED: One Stokes fully automatic molding press—Either 15 or 50 ton. State price, year and condition. Plastic Products, Inc. 415 Lexington Avenue, New York 17, N.Y.

WANTED: Self-contained electrically heated 3-opening, or better, hydraulic laminating press, approx. 36"x36" or larger sheet size. Advise where may be seen and price. Box 913, Modern Plastics.

PLASTIC OR RUBBER PRESS WANTED: used 200-300 Ton Upright Press of approximately the following specifications. 4 posts with well guided moving platen, 18" to 24" square platens, 26" of daylight, 14" or 15" diameter ram to be used on 3500 lb. water pressure. 16" stroke. Advise price and where can be seen. American Emery Wheel Works, P. O. Box 1501, Providence, R.I.

(*Continued on page 214*)

Naugatuck Vibrin Polyester brings 10% better reception to television

This polyester success story may well suggest ways you can use the advantages of the new Naugatuck Vibrin in *your* product. Simply read what happened—then send the coupon below and see what Vibrin can do for you.

Some time ago, the Lanfare Molded Products Company of Toledo, Ohio replaced its standard aerial insulator material with the new Vibrin (above, in red). Result: Aerial pick-up *improved television reception 10%!**

Why? Because Vibrin introduced *superior insulation* and *low water absorption*. In addition, its *damping effect* eliminated rod breakage. What's more, Vibrin reduced production assembly time and cost.

How did Vibrin do it? The outstanding combination of properties below will help to explain. Vibrin can be used in all sorts of applications . . . mountings, aircraft parts, fishing rods, housing panels, table tops, countless more. Vibrin is a product of the United States Rubber Company's Naugatuck Chemical Division—from its modern plastic resin laboratories—*base* of your plastics future.

SOME OUTSTANDING VIBRIN PROPERTIES

Easy to to handle — lightweight finished products • Cures without porosity • 100% reactivity — no weight change • Electrical grades — low water absorption • Wide hardness range • Full color range • Flame-resistant types

*Aerial manufactured for Target Company, Toledo, Ohio

START YOUR VIBRIN FUTURE NOW!

Naugatuck Chemical Plastics Division, Elm St., 24
Naugatuck, Conn.

Without charge or obligation, please send:
Experimental samples ( )
Full technical data on properties, uses, handling methods ( )

NAME ..... TITLE .....

COMPANY .....

ADDRESS .....

CITY ..... ZONE ..... STATE .....

Naugatuck Chemical

Division of **UNITED STATES RUBBER COMPANY**
NAUGATUCK, CONNECTICUT

BRANCHES: Akron • Boston • Charlotte • Chicago • Los Angeles • New York
Philadelphia • **In Canada:** Naugatuck Chemicals, Elmira, Ontario

MARVINOL vinyl resins • KRALASTIC styrene copolymers • VIBRIN polyester resins

CLASSIFIED ADVERTISING

(*Continued from page 211*)

WANTED: a T or T4 single stroke Stokes Preform Press used or new. Reply Box 914, Modern Plastics.

WANTED: Vertical Triplex Pump 15 GPM at 3000 lbs. Advise make, model and drive. Also, age and condition. Reply Box 914, Modern Plastics.

WANTED: 1-oz. Model H-200 Van Dorn injection press. Will consider vertical press to 2-oz's. with toggle or hydraulic clamping mechanism. State mechanical condition, model, age, hours operated and price in reply. Erickson Laboratories, 420 2nd & Pine Bldg., Seattle 1, Wash.

MATERIALS WANTED

WANTED: PLASTIC Scrap or Rejects in any form. Acetate Butyrate, Polystyrene, Acrylic, Vinyl Polyethylene, etc. Also wanted surplus lots of phenolic and urea molding materials. Custom grinding, magnetizing and compounding. Reply Box 880, Modern Plastics.

WANTED: PLASTIC SCRAP or REJECTS in any form: Cellulose Acetate, Butyrate, Polyethylene, Polystyrene, Vinyl, Acrylic and Ethyl Cellulose. Reply Box 881, Modern Plastics.

WANTED: Plastic Scrap, Rigid Vinyl, Cellulose Acetate, Polystyrene, Polyethylene, Butyrate, Custom grinding, magnetizing, compounding, and straining of contaminated plastics. Franklin Jeffrey Corporation, 1671 McDonald Avenue, Brooklyn, N. Y. ES 5-7943.

WANTED: Plastic Scrap & Rejects in any form, such as Cellulose Acetate, Butyrate, Polystyrene, Soft & Rigid Vinyls, Polyethylene, Lucite & Plexiglas scrap and offcuts. Claude P. Bamberger, Inc 59 Carmine St., New York 14, N.Y. Tel.: CHelsea 2-1241.

WANTED: Your Scrap Vinyl, Polyethylene, Polystyrene, Acetate, Ethyl Cellulose, and etc. OFFERING: Reprocessed Pellets, Custom Grinding. Reply Industrial Plastic & Textile Company, 72 Woolsey Street, Irvington, N. J.

WANTED: ACRYLIC SCRAP, Lucite or Plexiglas. Injection, compression or sheet; clear or colored; painted or metallized; ground or unground. Can use any quantities available. Reply Box 906, Modern Plastics.

WANTED: .002, .003 or .005 – #1925 or #1930 Bakelite Cast film. Natural Only. Any amount from 100 lbs. Also .002 – .003 Polythene. NU-STYLE PLASTICS CO., 1222 S. Michigan Ave., Chicago 5, Illinois.

WANTED: Nylon Scrap FM10001. Must be clean and free of contamination. Molded Products Company, Inc., P.O. Box 7281, Fort Worth, Texas.

HELP WANTED

HELP WANTED MALE—Purchasing, Expediting, Production Control. Must have experience in plastic injection molding plant. Permanent position for young aggressive man on Long Island. Reply Box 889, Modern Plastics.

PLASTICS ENGINEER WANTED: Experienced in estimating parts and mold costs. Chicago area. Reply Box 907, Modern Plastics.

Injection molding division of a medium sized, growing company near Detroit is looking for an engineer for estimating and product development work. Job requires engineering training or equivalent experience, and 2-5 years experience in molded plastics. Salary open. Reply giving details of education, past earnings, experience, and salary requirements. This information will be held confidential. Reply Box 908, Modern Plastics.

CUSTOM MOLDING REPRESENTATIVE: Progressive midwest molding company doing compression, transfer, and injection molding, is expanding its sales program in custom molding. Representative required for east, south, midwest, and near west. Must be experienced and capable of handling problems in the field. Commission basis. Give all qualifications in first letter. Reply Box 909, Modern Plastics.

MECHANICAL ENGINEER: Excellent opening for technically trained mechanical engineer with knowledge of or interest in rubber and plastic processing equipment and related activities for development work with major manufacturer. Salary to be commensurate with proven ability and experience. Location—Chicago. Reply Box 910, Modern Plastics.

PRODUCTION COATING SUPERVISOR: An excellent opportunity for a technically trained man with major experience in rubber and plastic coatings on fabric or paper plus knowledge of solution mixing, storage and handling of plastic and rubber solutions and spreaders and ovens to assume supervisory responsibility in an enlarging production section of a major manufacturer. Production primarily concerned with adhesives. Salary and responsibility to be commensurate with ability. Location Chicago. Reply Box 911, Modern Plastics.

WANTED for extrusion plant, Engineer with production and compounding experience. Our employees know of this advertisement. Reply Box 916, Modern Plastics.

PLANT MANAGER for Injection and Compression Molding. Knowledge of molds, production, cost analysis important. State full particulars and salary requirements. Reply Box 912, Modern Plastics.

PRACTICAL Plastics Engineer, capable of developing and supervising manufacture of an asphalt base plastic material as well as production molding articles from it and in some instances necessary paint finishing thereof. We have patent and small production already established. Prefer man not now a "big" man in present position, but one who feels he has the experience and ability to build and head a department in a small but growing business in association with which he can carve out for himself a real substantial future, and enjoy safe comfortable living for his family in one of the most beautiful spots of country in the East yet only 65 miles from New York and 50 miles from Philadelphia. Our organization knows of this advertisement. Write giving full particulars of self. Reply Box 918, Modern Plastics.

PLASTIC ENGINEER prominent plastic molder in the Cleveland area desires services of a Plastic Engineer, age 30 to 50 years. Degree helpful but not a requisite must be experienced on compression molding and have ability to quote piece part prices. Salary. Give complete details in first letter. Reply Box 919, Modern Plastics.

MISCELLANEOUS

VINYL COMPOUND SPECIALIST—Seven years' experience, last three as Chief Chemist. Desire Position either in development, plant management, technical service or technical sales. Experience includes extrusion techniques and specialty formulations. Also have wide knowledge of other thermoplastics. I am 30 years old, married and have a degree in Chemistry. Reply Box 904, Modern Plastics.

AVAILABLE: Injection Molding Powders, Small lots of acetate, butyrate and polystyrene are available in various colors and phosphorescent. Reply Box 886, Modern Plastics.

FOR SALE: Vinyl plastic lacing or "Gimp." New on spools. Size .031 x .036 White—108,000 yds., Red—69,175 yds., Yellow—202,350 yds., Blue—159,425 yds. $3.75 per 1000 yds. for the lot. New Plexiglas trays, 50¢ lb. for lot, 1/2 lb. each quantity 1,800. Samples on request. Prices F.O.B. Kansas City. Woodco Sales, 316 W. 9th, Kansas City.

FOR SALE: Dies for injection molding. 2-cavity Hollywood Bank. 6-cavity 9 ounce tumbler. 4-cavity flower pot. 6-cavity automobile mold. Complete set dies for tobacco and pipe humidor complete with all metal parts necessary to produce 50,000. Also available 2 complete sets of 2-cavity molds to produce teapot salt and pepper ensembles for production outside the United States or for sale of merchandise outside of the United States. Reply Box 887, Modern Plastics.

MONEY FOR MOLDS: Turn molds you're NOT using into cash you CAN use. Send full details to Box 900, Modern Plastics.

PLASTIC MOLDING PLANT EXECUTORS OFFER FOR SALE NEW INJECTION-COMPRESSION-PLUNGER MOLDING PLANT
Complete molding plant including 2 Watson Stillman 6 oz. #6E 100 ton machines, complete with Wheelco Temperature Controls. Kane Automatic Boiler; scrap grinder; Lydon Dryer Oven with automatic controls; molding frames; punch press; drill press; lathe; Dodge 1949 Station Wagon. Plant fully equipped, new machinery, MOLDING MATERIAL AND ALLOCATIONS. Inspection by appointment Evans & Markel, 109 Church Street, New Haven or Gerson T. Margolish, 521 Fifth Avenue, New York City.

FOR SALE: One of the most modern small molding plant in the east—a little gem of a unit . . . . Ideal as a private source for the large user . . . Has its own distinctive line listed with major chains . . . has large clientele custom molding both injection and compression preferred accounts . . . owner retiring. Reply Box 903, Modern Plastics.

DISTRIBUTION: We have a warehouse in St. Louis, Des Moines and Memphis and salesmen covering a wide area from each location. If you need effective representation in the Mississippi Valley territory we are interested in contacting you. WRITE: STANDARD NEON SUPPLY CO., INC., 1619 North Broadway, St. Louis 6, Missouri.

TOY MANUFACTURER wishes to contact source for Acetate Balls, sizes: 2 1/2", 1 1/2", 1 3/8". Reply Box 921, Modern Plastics.

VINYL SCRAP: We generate a good grade of vinyl scrap, containing only virgin resin and top quality plasticizers, which we would like to trade for raw dispersion grade vinyl resin or dioctyl phthalate. For samples write to Box 920, Modern Plastics.

FOR SALE: Injection Molding Plant located in large southern city. One eight ounce machine in excellent condition. Molds, granulator, and all accessory equipment in A-1 condition. Priced for quick sale. Reply Box 917, Modern Plastics.

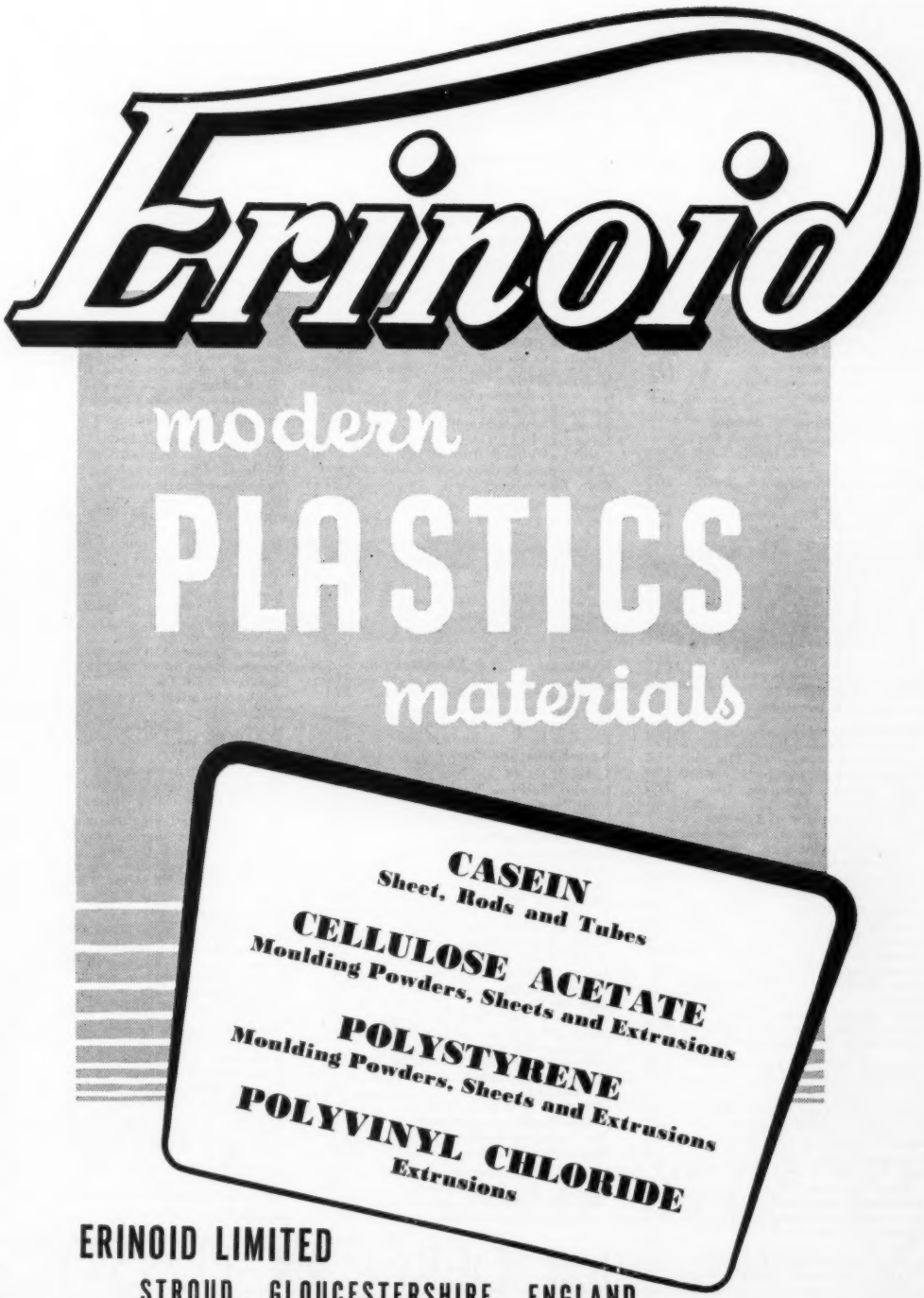
LINES WANTED: New York sales representative, covering major 5¢ to $1.00 Chain Stores, desires to contact stock molders of plastic items, housewares, toys, notions, novelties, etc. Have over 20 years' experience in marketing plastic items to the big Syndicates, and can produce volume sales. Quick action; commission basis. Box 882, Modern Plastics.

WANTED TO BUY: Several molds for molding Polyethylene Ice Cube Trays. Any size. Reply Box 923, Modern Plastics.

All classified advertisements payable in advance of publication

Up to 60 words $7.50	Up to 120 words $15.00	Up to 180 words $22.50
Up to 60 words (boxed) ... $15.00	Up to 120 words (boxed) ... $30.00	Up to 180 words (boxed) ... $45.00

For further information address Classified Advertising Department, Modern Plastics, 575 Madison Avenue, N. Y. 22, N. Y.


Erinoid
modern
PLASTICS
materials
CASEIN
Sheet, Rods and Tubes
CELLULOSE ACETATE
Moulding Powders, Sheets and Extrusions
POLYSTYRENE
Moulding Powders, Sheets and Extrusions
POLYVINYL CHLORIDE
Extrusions
ERINOID LIMITED
STROUD, GLOUCESTERSHIRE, ENGLAND

INDEX OF ADVERTISERS

APRIL 1951

Ace Plastic Company 196
Acheson Colloids Corporation ... 157
Acromark Company, The 192
Adamson United Company 29
Advance Solvents & Chemical Corp. 143
Allied Chemical & Dye Corp., The Barrett Division 129
American Cyanamid Co., Calco Chemical Div., Dyestuff Department 123
American Cyanamid Co., Plastics Department 112, 113
American Molding Powder & Chemical Corp. 155
American Pulverizer Co. 171
Amos Molded Plastics 19
Amsco Packaging Machinery, Inc. 197
Anderson Bros. Mfg. Co. 205
Apex Machine Mfg. Corp. 195
Atlas Electric Devices Co. 192
Atlas Valve Company 188

Bakelite Company, A division of Union Carbide & Carbon Corp. ..... 21, Inside Back Cover
Bamberger, A., Corporation 54
Barker-Davis Machine Co., Inc. .. 167
Barrett Division, The, Allied Chemical & Dye Corp. 129
Becker, Moore & Co., Inc. 164
Bellows Company, The 165
Black-Clawson Co., The, Div. of Dilts Machine Works 191
Boonton Molding Co. 36
Borden Co., The, Chemical Div. .. 25
British Industrial Plastics Engineering Ltd. 26
British Plastics Exhibition & Convention 188
Brookfield Engineering Labs., Inc. 186
Brown Company 205
Buttondex Corporation 149

Cadillac Plastic Co. 138
Cambridge Molded Plastics Co. .. 177
Carborundum Company, The ... 32
Carpenter Steel Co., The 199
Carter Products Company, Inc. .. 185
Carver, Fred S. Inc. 65
Catalin Corporation of America .. 1
Celanese Corporation of America, Plastics Division 9
Chicago Molded Products Corp. .. 4
Chicago Show Printing Co. 50
Ciba Co., Inc., Plastics Div. 61
Cincinnati Milling Mach. Co., The 58
Classified 212, 214
Columbia Protektosite Co., Inc. .. 52
Connecticut Plastics Products ... 156
Continental Can Company 151
Crown Machinery & Equipment Sales Co. 186
Cruver Manufacturing Co. 44
Crystal Plastics, Inc. 176
Cumberland Engineering Co., Inc. 37

Daniels, T. H. & J., Ltd. 198
Deakin, J., Arthur & Son 142
Deecy Products Co. 164
DeMattia Machine & Tool Co. ... 33
Dennis Chemical Company 211
Detroit Stamping Company 155
Diamond Alkali Company 34
Dilts Machine Works Div., The Black-Clawson Co. 191
Distillation Products Industries .. 46
Dow Chemical Company, The 63, 203
Dunning & Boschert Press Co., Inc. 154
du Pont de Nemours, E. I., & Co. (Inc.), Electrochemicals Dept. 184
du Pont de Nemours, E. I., & Co. (Inc.), Polychemicals Dept. .. 7
Durez Plastics & Chemicals, Inc. Inside Front Cover

Eastman Kodak Company, Cellulose Products Division 207
El Paso Chamber of Commerce .. 157
Electric Auto-Lite Co., The 137
Electric Auto-Lite Co., The Instrument and Gauge Div. 140
Emery Industries, Inc. 72
Erie Resistor Corp. 47
Erinoid Ltd. 215
Ever Ready Label Corp. 31

Fabricon Products, Inc., Plastics Division 162
Farrel-Birmingham Co., Inc. .. 42, 43
Fellows Gear Shaper Co., The 125
Ferro Enamel Corporation 168
Flambeau Plastics Corp. 148
Flintkote Company, The 27
Foredom Electric Co. 156
Formica Company, The 139

General Electric Company Back Cover
General Industries Co., The 64
Gering Products, Inc. 16, 149, 167, 197
Girdler Corporation, The 131
Goodrich, B. F., Chem. Co., The .. 3
Goodyear Tire & Rubber Co., The Chemical Division 41
Gries Reproducer Corp. 197

Hardesty Chemical Co., Inc. 147
Hercules Powder Company .. 59, 141
Hobbs Manufacturing Co. 157
Holliday, W. J., & Co., Inc. 193
Hydraulic Press Mfg. Co., The ... 20

Industrial Heater Co., Inc. 183
Industrial Mfg. Corporation 198
Industrial Plastics Co. 30
Industrial Research Labs., Ltd. .. 162

Keeler & Long, Inc. 185
Kentucky Color & Chemical Co., Inc. 188
Kingsley Stamping Machine Co. . 211
Koppers Company, Inc. 45
Krieger Color & Chemical Co. ... 217
Kuhn & Jacob Molding & Tool Co. 186
Kurz-Kasch, Incorporated 17

Lane, J. H., & Co., Inc. 161
Lembo Machine Works Inc. 140
Lind Plastic Products 205
Lucidol Div., Novadel-Agene Corp. 159

Mack Molding Co,, Inc. 163
MacRay Engineering Co. 187
Marblette Corporation 116
Metasap Chemical Company 68
Michigan Chrome & Chemical Co. 154
Michigan Molded Plastics, Inc. .. 171
Midland Die & Engraving Co. 102
Miller, Frank & Sons 183
Miller Motor Company 173
Mills, Elmer E., Corporation 55
Mirro-Plex, Inc. 217
Mitts & Merrill 192
Modern Plastic Machinery Corp. . 13
Molded Products Corporation ... 56
Monsanto Chemical Company, Organic Chemicals Division ... 209
Monsanto Chemical Company, Plastics Division 53
Mosinee Paper Mills Co. 119
Moslo Machinery Company 184
Mt. Vernon-WoodBerry Mills 57
Muehlstein, H., & Co., Inc. 195

Nash, J. M., Company 194
National Erie Corporation 164
National Forge & Ordnance Co. Testing Machine Div. 147
National Lead Company 28
National Rubber Machinery Co. .. 38
Naugatuck Chemical 213
New Hermes, Inc. 161
Newark Die Company 168
Nixon Nitration Works 23
Nordan Plastics Corp. 167
Northern Industrial Chemical Co. 159
Norton Laboratories, Inc. 67
Novadel-Agene Corporation, Lucidol Division 159

Olsen, Tinius, Testing Machine Co. 62
Owens-Corning Fiberglas Corp. .. 12

Palmer, Homer W., & Co., Inc. .. 191
Parker-Kalon Corporation 24
Parker Stamp Works, Inc., The .. 146
Pittsburgh Plate Glass Company, Columbia Chemicals 66
Plaskon Div., Libbey-Owens-Ford Glass Co. 107-110
Plax Corporation 48, 49
Preis, H. P., Engraving Mach. Co. 217
Process Mold Co. 211
Progressive Machine Co., Inc. 148
Projectile & Engineering Co., Ltd., The 138
Prophylactic Brush Company ... 8

Quinn-Berry Corporation 40

Radio Receptor Co., Inc. 22
Reed-Prentice Corporation 11
Reichhold Chemicals, Inc. 133
Richardson Company, The 6
Rogers Corporation 14
Rohm & Haas Company, The Plastics Division 39
Rohm & Haas Company, The Resinous Products Div. 153

Safety Car Heating & Lighting Co. 138
Scott, Geo., S., Mfg. Co. 160
Severance Tool Industries, Inc. .. 149
Shaw Insulator Co. 190
Sinko Mfg. & Tool Co. 147
Socony-Vacuum Oil Co., Inc. 135
Standard Machinery Co., The 176
Standard Tool Co. 174
Stanley Chemical Company 172
Sterling, Inc. 195
Stokes, F. J., Machine Co. 170
Stone & Webster Engineering Corp. 201
Sturtevant Mill Company 18
Swedlow Plastics Co. 35
Syntron Co. 168

Tennessee Eastman Company ... 127
Timken Roller Bearing Co., The . 175
Tinnerman Products, Inc. 71
Toledo Scale Company 191
Tri-State Plastic Molding Co. 60
Tumb-L-Matic, Inc. 179
Tupper Corporation 10

Union Carbide & Carbon Corporation, Bakelite Company ..... 21, Inside Back Cover
United Buff Products Corp. 160
U. S. Rubber Company 178, 179

Van Dorn Iron Works Co., The .. 145

Waldron, John, Corp. 163
Waterbury Companies, Inc. 166
Watertown Mfg. Company 169
Watson-Standard Co., The 70
Watson-Stillman Co., The 15
Westchester Plastics Inc. 180
Wheelco Instruments Co. 159
White, S. S., Dental Mfg. Co. 142
Windsor, R. H., Ltd. 51
Witco Chemical Company 121
Wood, R. D., Company 143
Worcester Moulded Plastics Co. .. 218

Zenith Plastics Co. 69

MODERN PLASTICS

575 MADISON AVENUE • NEW YORK 22, N.Y.

POLY-SUPRA Molding Powder Colors...

I'M MATCHLESS AT MATCHING D. O. SPECS!

The color specifications of the Armed Forces—the special requirements of any part of the defense program—all can be met with speed and accuracy through Poly-Supra Service.

You have at your disposal a specialist staff of color chemists, a complete experimental laboratory and the assurance of rigid tests for heat stability, light, fastness, dispersion, abrasion, toxicity, brilliance, shade and color match before delivery.

17 standard colors, also over 1500 colors in metallics, fluorescent, mottled and pearl effects, transparent, opaque and translucent. Pre-packed ready-to-use for 100 lbs. of Crystal, or in bulk, as desired.

Poly-Supra...Your Guarantee of Quality
Recommended by Monsanto and also used in Dow, Bakelite and Koppers Crystals by over 400 molders worldwide.
Product Protection: Products Liability Insurance.
Color Conformity: U. S. Bureau of Standards.

Communicate with us NOW!

POLY-SUPRA THE MOLDER'S PET

POLY-SUPRA KRIEGER COLOR & CHEMICAL COMPANY
ORIGINATORS OF DRY COLOR FOR MOLDING
6531 Santa Monica Blvd. • Hollywood 38, Calif.

New

PANTO-ENGRAVER MODEL 2D-4

ENGRAVE
LARGE PANELS
NAME PLATES
STEEL STAMPS
STEEL DIES
AND OTHER ITEMS

On this precision two-Dimensional Engraving Machine. Engraves to center of 30" wide panels. Precision Ball Bearings throughout. Pantograph Reductions from 1:1 to Infinity. Collet capacity 1/10" to ¼" Diameter. Six spindle speeds from 5000 to 14000 R.P.M.

Several other models available for Engraving, Acid Etching and Electrical Marking.

WRITE FOR ILLUSTRATED LITERATURE TODAY
H. P. PREIS ENGRAVING MACHINE COMPANY
653 ROUTE 29 HILLSIDE 5, N. J.

MARKING PANTO EQUIPMENT

Spray Plate and promote a winner!

BY THE VACUUM OR NITRATE METHOD

Our plating of gold, silver and pastel colors will improve the appearance and durability of your product. This enables you to produce and promote money-making items. Our plating is highly effective on small metal and plastic items such as combs, novelties, brooches, clips, sprays, earrings and other plastic jewelry.

Inquiries are welcomed and samples are processed immediately free of charge. Send us samples of your products for plating in lots of twelve.

mirro-plex, inc.
160 FIFTH AVENUE • NEW YORK 10, N. Y.
WAtkins 9-3030

"FINISHES THAT SPARKLE"

No Government Curtailment on Materials Used

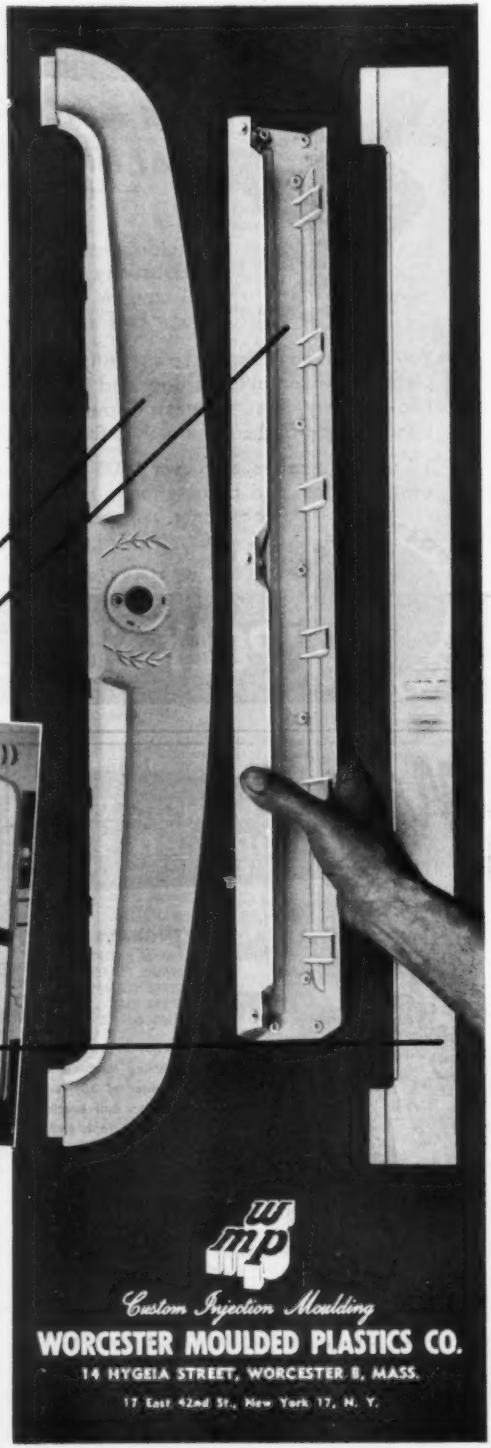
Refrigerated down to the floor with the help of WMP!

This new, larger capacity model Philco refrigerator is refrigerated all the way down to the floor thanks to the greater efficiency of the power unit and insulation, and to the three WMP moulded breaker strips. Two of the strips keep the insulation in place at the top and bottom of the refrigerator. The third, the center rail, effectively isolates the freezing compartment.

You can obtain more production capacity with less production space, if you, like Philco, let us serve as your plastics department. Our record of producing custom mouldings of custom made quality is an indication of our ability to serve you.

Are you converting to defense work utilizing plastics? Our past 5 Army and Navy E's performance, plus our knowledge of government requirements, guarantees you an important ally, plastically speaking.

Courtesy the Philco Corporation, Philadelphia, Pa.

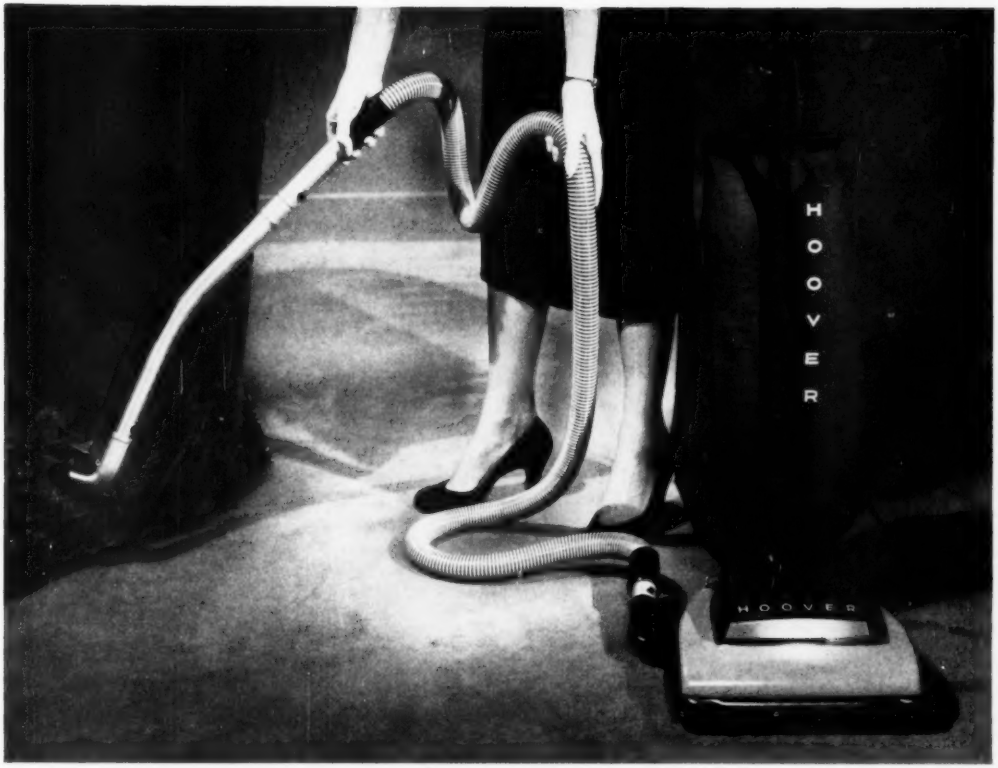


Custom Injection Moulding

WORCESTER MOULDED PLASTICS CO.

14 HYGEIA STREET, WORCESTER 8, MASS.

17 East 42nd St., New York 17, N. Y.



You'll clean up too...

WITH VINYLITE BRAND PLASTICS!

Outstandingly original in concept and design, this new "Veri-Flex" vacuum cleaner hose—introduced by The Hoover Company—is gaining widespread attention among designers . . . and instant acceptance among consumers.

The hose is made by extruding a tube of VINYLITE Brand Plastic flexible compound over coiled wire, then wrapping VINYLITE Plastic extrusion material spirally around the assembly. The finished product is light in weight, extremely flexible, and strong.

Advantages don't stop there. Its dirt-shedding glossy finish is unique in such equipment. It is richly colored to match the appliance. It is stain resistant because dirt, water, greases, oils, alkalies, even most strong acids, don't affect it.

VINYLITE Elastomeric molding and extrusion compounds are making many other useful products better and less costly, including knobs, sockets, grommets, pedals, bumpers, sleeves, handlebar grips. Contact Bakelite Company engineers. Find out how these colorful, durable VINYLITE Plastics can speed production, improve quality, and hit "pay dirt" for you! Tell us your specific production problems. Write Dept. JP-7.

Data Courtesy The Hoover Co.,
101 Maple Street, North Canton, Ohio

Vinylite
BRAND
PLASTICS

TRADE MARK

BAKELITE COMPANY
A Division of
Union Carbide and Carbon Corporation
30 East 42nd Street, New York 17, N. Y.

One of a series of messages to design engineers to show how General Electric's *specialized* plastics molding service is geared to highly efficient defense and industrial production.

HOW GE Specialized MOLDING SERVICE

ASSURES FINER QUALITY PLASTICS PARTS

The General Electric plastics molding service includes one of the country's largest and most expertly staffed shops for making plastics molds. G-E mold-making artisans average thirteen years in this specialized work. Their skill and imagination are largely responsible for the high-quality finish and dimensional accuracy in every G-E molded part. *The foundation of successful plastics molding is the making of the mold itself.*

For details on General Electric tool-making and plastics molding service, write to Section B-2, Chemical Department, General Electric Company, Pittsfield, Massachusetts.

Molded Plastics for Defense—*Defense contractors can depend on General Electric for developing and producing a great variety of molded plastics parts. The broad scope of this service is indicated by G-E compression equipment ranging in capacities from 3 to 36 inches; injection equipment that can handle shots of from 1½ to 208 ounces.*

GENERAL ELECTRIC